NATIONAL CANCER INSTITUTE

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In this issue:

New Studies Highlight the Value and Timing of Colonoscopy...1

Director's Update...1
- Continuing the Legacy of a Great Leader

Spotlight...3
- After Gleevec, Targeted Drugs Acquire More Targets

Cancer Research Highlights...4
- RNA Interference Technique Causes Toxicity in Mice
- Cryoablation for Small Renal Tumors Shows Promising Results
- MRI Screening Is Cost Effective for Some BRCA Carriers
- Transfusions During Surgery Linked to Cancer-Related Mortality

Funding Opportunities...6

Featured Clinical Trial...6
- Flavopiridol for Previously Treated Chronic Lymphocytic Leukemia

Notes...7
- Joint Research Fellowships in Cancer Available
- Coffee, Tea, & Chats at Mark O. Hatfield Clinical Research Center
- IARC Welcomes India and Korea

Cancer Center Profile...8
- UC Davis Cancer Center

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New Studies Highlight the Value and Timing of Colonoscopy

Two studies of colonoscopy screening reported in the May 24 and 31 *Journal of the American Medical Association* (*JAMA*) fortified evidence of the test's value, and "address two very important and unresolved questions," according to an accompanying editorial.

Is 10 years the right amount of time to wait for a second colonoscopy after a negative initial colonoscopy exam? Absolutely, according to researchers at the University of Manitoba in Winnipeg, Canada, who conducted a retrospective population-based analysis using a cohort of 35,975 patients screened over a period of 15 years from 1989 to 2003.

The second question is whether people 80 years of age and older will increase their life expectancy by colonoscopy screening.

The answer here, according to researchers who followed 1,244 individuals after colonoscopy screening at the Virginia Mason Medical Center in Seattle, is yes, but not by much: Those over age 79 gained only 0.13 years by screening, which is just

(continued on page 2)

Director's Update

Guest Update by Dr. Mark B. Clanton

Dr. Mark B. Clanton, Deputy Director, NCI, and Deputy Director for Cancer Care Delivery Systems

Continuing the Legacy of a Great Leader

Last week, the world lost one of its most important public health leaders, Dr. Lee Jong-Wook, the Director-General of the World Health Organization (WHO). It's not often that the passing of a single individual is mourned by people worldwide, but in the case of Dr. Lee, it's absolutely true.

And that's because his work touched so many. Dr. Lee dedicated his life to improving the health of children and adults on every continent—orchestrating programs that have had a substantial impact on reducing the rates of diseases such as tuberculosis and polio, and have led to the proliferation of new and better vaccines to protect children from preventable but often deadly diseases.

Not surprisingly, Dr. Lee's reach extended directly into the global prevention of cancer. In 2004, he helped oversee the development and ratification of the global Framework Convention on Tobacco Control. More recently, during last year's WHO

(continued on page 2)

(Colonoscopy continued from page 1)
15 percent of the 0.85 years gained by those aged 50 to 54.

"Very elderly patients and their physicians are using individual judgment to decide whether to undergo screening" with colonoscopy, explains lead author Dr. Otto S. Lin. While studies show that high rates of colorectal neoplasia are likely to be detected, he adds, the slow rate at which these cancers progress means they are much less likely to be the cause of death in the elderly. And those considerations must be weighed against the risks associated with screening, including bowel perforation and gastrointestinal bleeding.

The Canadian study, led by Dr. Harminder Singh, examined how risk changes over time in those whose index colonoscopy detected no polyps. Researchers compared the incidence of colorectal cancer among the cohort with that of the general population of the province of Manitoba. Colonoscopy screening reduced cohort members' risk by 31 percent 6 months after the initial exam.

Over the next 10 years, their risk of colorectal cancer actually decreased because any cancers that were missed by the initial screening presented themselves sooner rather than later, thus leaving truly cancer-free people in the cohort. At 1 year, risk is down to 66 percent compared with the general population; at 2 years, 59 percent; at 5 years, 55 percent; and at 10 years, risk falls to 28 percent.

These results reinforce the current recommendation by the American College of Gastroenterology (ACG), which is based on observational studies: By age 50, individuals should undergo a colonoscopy every 10 years. Since the cost of screening 1 in 10 Americans over age 50 each year is more than $4 billion, reasoned Dr. Timothy R. Church of the University of Minnesota in the editorial, "it may well be time" for a randomized controlled trial to definitively assess the efficacy of colonoscopy.

Although colonoscopy is preferred by ACG, the U.S. Preventive Services Task Force, the Centers for Disease Control and Prevention, and the American Cancer Society, each recommends slightly different guidelines for different populations, including at least four other tests that are routinely available: the fecal occult blood test (FOBT), flexible sigmoidoscopy, digital rectal exam, and double contrast barium enema.

What is clear, said Dr. Asad Umar, acting chief of the Gastrointestinal and Other Cancers Research Group in NCI's Division of Cancer Prevention, "is that the majority of Americans over 50 are not getting screened every 10 years via colonoscopy. Following alternative recommendations, everyone should be screened by FOBT annually, or by flexible sigmoidoscopy or double contrast barium enema every 5 years because three out of four colorectal cancers strike people with no family history or other known risk factors, and are very treatable when detected early."

While colorectal cancer is expected to kill 55,170 Americans in 2006, it's estimated that 33,000 of these deaths could be prevented if people aged 50 years or older underwent regular screenings. ◆

By Addison Greenwood

(Director's Update continued from page 1)

World Health Assembly (WHA), he was instrumental in the passage of the first-of-its-kind global cancer prevention and control resolution.

Resolution WHA58.22 (cancer control) calls for improved cancer prevention measures, improved early detection and treatment, and more palliative care in all WHO Member State countries. Dr. Lee was charged with developing and implementing this global strategy and, over the course of the last year, created two groups within WHO to help do so: the Director-General's Cancer Advisory Committee and the Cancer Technical Working Group, on both of which I have the privilege of serving as the NCI representative.

The Cancer Technical Working Group, which includes some of the world's leading cancer control researchers, was charged with writing a global comprehensive cancer control plan. Over the past year, the group has drafted modules that span cancer control planning, prevention, early detection, treatment, and palliative care.

These modules currently are in various stages of review. In addition to the scientific expertise that NCI is providing to WHO in this initiative, NCI also has provided a grant to support the eventual publication and dissemination of the entire strategy document.

I'm also the NCI lead for another important project with the International Atomic Energy Agency (IAEA) as part of a program called the Program of Action for Cancer Therapy, or PACT. IAEA has provided radiation therapy machines in low-resource settings for the last decade, giving support to treatment centers in developing countries so they can deliver appropriate radiation therapy to patients. Using the funds it received for winning the 2005 Nobel Peace Prize, IAEA is now greatly expanding these cancer control activities through the launch of the PACT Alliance—an alliance of cancer organizations from across the

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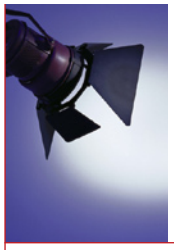


Spotlight

After Gleevec, Targeted Drugs Acquire More Targets

Targeted therapies were the big news last year at the American Society of Clinical Oncology (ASCO) annual meeting, where researchers presented results showing that many patients had benefited from drugs that interact with one particular molecule.

This year's meeting, which opens in Atlanta on Friday, will preview the next generation of targeted therapies, such as drugs for patients who cannot take the first-generation drugs and "multitargeted" drugs that interact with a small number of proteins rather than just one.

Like imatinib (Gleevec), trastuzumab (Herceptin), and other drugs created to hit a single target, the newer medicines are much less toxic than chemotherapy. And the hope is that by engaging more targets, these drugs will work when others do not and possibly against multiple cancers.

This idea was validated in January, when the Food and Drug Administration (FDA) issued its first dual approval for a drug. The agency approved sunitinib (Sutent) for kidney cancer and for gastrointestinal stromal tumors (GIST) when the primary treatment, imatinib, fails.

Sunitinib was designed to inhibit several proteins involved in two key aspects of cancer—cell growth and the formation of blood vessels that feed tumors, or angiogenesis.

"After starting with very nonspecific medicines such as chemotherapy, we're now going around a corner again toward more broadly targeted agents that hit multiple genetic pathways," says Dr. George Demetri of the Dana-Farber Cancer Institute, who led the clinical trials for sunitinib.

"The good news is that the more broadly targeted drugs may be applicable to different cancers, as we've seen with sunitinib," says Dr. Demetri.

In his research on GIST, Dr. Demetri has gone from being "laser focused" on a single protein to focusing on multiple pathways, or interactions, that involve many proteins inside the cell.

"The good news is that the more broadly targeted drugs may be applicable to different cancers, as we've seen with sunitinib."

—Dr. George Demetri

He points out that the word "targeted" has caused confusion, even among scientists, because all drugs have targets, including chemotherapy. But compared with chemotherapy, targeted drugs do a better job of killing only cancer cells.

Their stunning selectivity was first illustrated in the late 1990s, when researchers reported that imatinib could shut down a single mutant protein in patients with chronic myeloid leukemia (CML), often sending the disease into remission.

But imatinib stops working in some patients eventually, while others cannot tolerate the drug. Two medicines for these patients have been in clinical trials, and one of them, dasatinib, will be reviewed by an FDA drug advisory committee at ASCO on Friday.

Dasatinib targets nearly all the genetic mutations that cause resistance to imatinib and is "an important step forward," for many patients, says Dr. Neil Shah of the University of California, San Francisco, who will present findings from dasatinib trials at ASCO.

For some CML patients who do not tolerate imatinib, it can be devastating to learn that they cannot take "one of the great advances in cancer medicine," says Dr. Shah. But many of these individuals benefit from dasatinib, and "that's quite exciting."

ASCO will also feature results from trials involving another multitargeted drug, lapatinib (Tykerb). GlaxoSmithKline recently announced plans to seek FDA approval for lapatinib as a treatment for metastatic breast cancer.

Interest in multitargeted drugs is high right now in part because researchers are not as worried as they once were about side effects associated with less specific drugs, says Dr. Brian Druker of Oregon Health & Science University Cancer Institute, who led the development of imatinib.

"There's been a change in thinking," he says. It used to be that the more specific drugs were preferred in order to limit side effects. But clinical studies have shown that most targeted drugs are well tolerated, and today there are fewer concerns about toxicity.

(continued on page 7)

Cancer Research Highlights

RNA Interference Technique Causes Toxicity in Mice

The idea of silencing aberrant gene expression by interfering with the RNA product after transcription holds promise in the field of cancer gene therapy. One possible technique under study for RNA interference is the delivery of short hairpin RNA strands (shRNA) that are complementary to the target aberrant RNA, by way of a viral vector. However, a study published in the May 25 *Nature* highlights the risk of unintentional inhibition of cellular microRNA (miRNA) by shRNA overexpression, which led to fatalities in mice.

The investigators transfected mice with high doses of shRNA and found that the resulting toxicity was also high—36 out of 49 shRNAs tested caused severe toxicity, and almost half of all shRNAs tested caused mortality within 2 months due to liver damage. This toxicity was not restricted to a particular shRNA sequence or target.

After further experiments to clarify the cause of the toxicity, the investigators found evidence of oversaturation of the endogenous shRNA processing machinery. This processing machinery is also needed by normal cellular miRNAs, which play an important role in the cell cycle and cellular development. The authors "therefore speculated that highly expressed 'toxic' shRNAs competed with miRNAs for intracellular processing, to such an extent that affected cells died."

Additional *in vivo* and *in vitro* experiments provided more evidence for this competition model, and identified a protein—nuclear karyopherin exportin-5—that is likely a limiting factor in the shared processing pathway. The investigators caution that, in future use of shRNA, "monitoring and controlling intracellular shRNA levels is imperative for guaranteeing stable *in vivo* gene silencing while mitigating adverse effects."

Cryoablation for Small Renal Tumors Shows Promising Results

Results from the study of the largest cohort of patients who have been followed for at least 5 years after cryoablation for small renal tumors were presented on May 21 at the American Urological Association's annual meeting. Dr. Nicholas Hegarty, a clinical fellow at the Cleveland Clinic, reported the follow-up data from 60 patients in their study, which began accrual in September 1997.

In cryoablation, tumor tissue is frozen and destroyed using small probes during open or laparoscopic surgery, or percutaneously under local anesthetic, depending on the tumor location.

Out of 60 patients treated with cryoablation for a solitary sporadic renal lesion, only 3 developed local tumor recurrence. All three underwent nephrectomy and remained disease free after the second surgery, though one patient died from other causes while on dialysis. One additional patient presented with distant metastases 6 months after cryoablation, but the investigators believe that the patient likely had occult metastases at the time of initial treatment. Because of the indolent nature of the disease, patients in the cohort will continue to be followed to acquire long-term survival data.

Advantages of the technique for surgeons include relative ease in performing the procedure, explained Dr. Hegarty. "A surgeon familiar with laparoscopic surgery typically will be able to perform this," he said. "We do not need to expose the renal vasculature, we do not need to clamp it, and there is no complex reconstruction like in a partial nephrectomy."

MRI Screening Is Cost Effective for Some BRCA Carriers

Women who carry *BRCA1* or *BRCA2* mutations and undergo regular screening for early breast cancer have the option of mammography alone or with magnetic resonance imaging (MRI). Now researchers at Stanford University School of Medicine and the VA Palo Alto Health Care System have come up with a cost per quality-adjusted life-year (QALY) for each option. Their findings are published in the May 24 *JAMA*.

The researchers used a computer model with a simulated cohort of *BRCA1/2* mutation carriers who were born in 1980 and followed them over their virtual lifetimes, beginning in 2005. The model incorporates a natural history of breast cancer based on SEER data. It also includes screening sensitivity, specificity, lead time, and overdiagnosis rates for MRI and

(continued on page 5)

(Highlights continued from page 4)
mammography, as well as treatment outcomes.

The results showed that among women aged 25 to 69, the QALY for *BRCA1* mutation carriers with the addition of MRI to annual mammography was $88,651, compared with $188,034 for *BRCA2* carriers. The combination of MRI and mammography was more cost effective for women at specific ages: the QALY was lowest between the ages of 40 and 49 at $43,484 for *BRCA1* carriers ($18,952 with mammography alone) and $111,600 for *BRCA2* carriers ($28,421 with mammography alone).

The authors conclude that with a threshold of $100,000 per QALY gained, adding annual MRI is cost effective for *BRCA1* carriers between the ages of 35 and 54, as well as for *BRCA2* carriers with especially dense breasts, for whom mammography is insensitive. They note that in the future, digital mammography and chemoprevention could affect QALY for these groups.

Transfusions During Surgery Linked to Cancer-Related Mortality

Receipt of blood transfusions during surgery for renal cell carcinoma (RCC) and prostate cancer significantly increases the risk of a patient dying from the disease compared with patients who receive fewer or no transfusions, Mayo Clinic researchers reported last week.

At a minimum of 5 transfused units, prostate cancer patients had a threefold increased risk of cancer-related mortality at 5 years. In kidney cancer patients, however, there was a dose-specific response to blood transfusion, with increased risk seen after the transfusion of a single unit, and incrementally increased risk associated with additional transfused units.

Speaking at the annual meeting of the American Urological Association in Atlanta, Ga., last week, Dr. Jonathan C. Routh reported that, of the more than 2,400 patients with RCC who had surgery at Mayo, the 5-year survival rates were 51.7 percent for those who received a transfusion and 83.1 percent for those who did not. The more units transfused, he said, the greater the mortality risk. More than 7,500 patients were included in the study of patients with adenocarcinoma of the prostate.

In both studies, the increased mortality risk associated with transfusion persisted even when potentially confounding factors such as tumor size and the stage of the cancer were taken into account. "Though these were the largest series to date to examine this phenomenon, these were retrospective studies, so there may have been biases that we did not correct for," Dr. Routh said.

Nearly 150 similar studies covering multiple cancer types have been performed, with differing conclusions on a possible transfusion-associated effect, Dr. Routh explains. Several theories have been put forth to explain the increased risk.

"Our laboratory is looking at whether this might be a T-cell mediated phenomenon," he says. "We have some very interesting preliminary data, but at this point nothing concrete to report."

Missed a Highlight?

The *NCI Cancer Bulletin* Archive allows you to search every issue of this online publication since January 2004. That's over 100 weeks' worth of articles on a variety of cancer research topics and updates. ◆

(Director's Update continued from page 2)
globe to help develop and implement cancer control programs in developing countries.

NCI will help support a pilot of this expanded PACT program, including bringing together a team of experts in cancer control from the United States to assist in its development and implementation.

Dr. Lee's death is a sad and unfortunate event. The impact of his life and work will be felt for decades to come, and his legacy is one of a tireless drive to improve the health of all humans, regardless of race, gender, age, or religion. I'm honored to be part of any effort associated with Dr. Lee and am proud—as I believe the entire U.S. cancer community should be—of NCI's continued commitment to reducing the global cancer burden. ◆

World No Tobacco Day Observed

May 31 is World No Tobacco Day, a global event first held in 1988 to call attention to the impact of tobacco use on public health and reduce individual tobacco dependence. Information about World No Tobacco Day can be found at http://www.wntd.com/about_index.cfm. Additional information and assistance with smoking cessation can be found at www.smokefree.gov or by calling 1-800-QUIT-NOW. ◆

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 ◆

Funding Opportunities

School-Based Interventions to Prevent Obesity

Announcement Number: PA-06-415
New Application Receipt Dates: June 1 and Oct. 1, 2006; Feb. 1, June 1, and Oct. 1, 2007.

This is a renewal of PA-04-145 and will use the R01 award mechanism. For more information, see http://cri.nci.nih.gov/4abst.cfm?initiativeparfa_id=3476. Inquiries: Dr. Amy Lazarus Yaroch—yarocha@mail.nih.gov

School-Based Interventions to Prevent Obesity

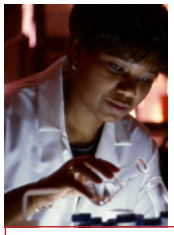
Announcement Number: PA-06-416
New Application Receipt Dates: June 1 and Oct. 1, 2006; Feb. 1, June 1, and Oct. 1, 2007.

This is a renewal of PA-04-145 and will use the R03 award mechanism. For more information, see http://cri.nci.nih.gov/4abst.cfm?initiativeparfa_id=3477. Inquiries: Dr. Amy Lazarus Yaroch—yarocha@mail.nih.gov

School-Based Interventions to Prevent Obesity

Announcement Number: PA-06-417
New Application Receipt Dates: June 1 and Oct. 1, 2006; Feb. 1, June 1, and Oct. 1, 2007.

This is a renewal of PA-04-145 and will use the R21 award mechanism. For more information, see http://cri.nci.nih.gov/4abst.cfm?initiativeparfa_id=3478. Inquiries: Dr. Amy Lazarus Yaroch—yarocha@mail.nih.gov ◆



Featured Clinical Trial

Flavopiridol for Previously Treated Chronic Lymphocytic Leukemia

Name of the Trial
Phase II Study of Flavopiridol in Patients with Previously Treated B-Cell Chronic Lymphocytic Leukemia (CLL) or Prolymphocytic Leukemia Arising from CLL (CLLRC-OSU-0491). See the protocol summary at http://cancer.gov/clinicaltrials/CLLRC-OSU-0491. This trial previously appeared in the October 25, 2005, *NCI Cancer Bulletin*.

Principal Investigator
Dr. John Byrd, Ohio State University and the CLL Research Consortium

Why This Trial Is Important
Chronic lymphocytic leukemia (CLL) is a blood cancer in which the bone marrow produces malignant lymphocytes, a type of white blood cell. CLL responds to standard treatments, such as chemotherapy and monoclonal antibody therapy, but the disease will recur and eventually become resistant to therapy.

In this trial, researchers are testing a drug called flavopiridol (also known as alvocidib) in patients with relapsed CLL. Flavopiridol was originally tested in the 1980s, after laboratory studies showed it had activity against CLL and other types of cancer cells. In these trials, however, the drug was not effective when given intravenously over 1 to 3 days. Subsequently, interest in it waned.

Recently, Ohio State University (OSU) researchers showed that the effectiveness of flavopiridol may depend on its route of administration, and a phase I trial testing a large dose of the drug given over 30 minutes followed by an additional dose given over 4 hours has shown promising results in patients with previously treated CLL. The current phase II trial seeks to confirm these results with a larger group of patients.

"Approximately 50 percent of patients who had relapsed after multiple treatments responded to flavopiridol in our study. More importantly, this drug is highly active in patients with high-risk genetic features who respond to few if any standard treatments," said Dr. Thomas Lin of OSU, principal investigator of the phase I trial.

Who Can Join This Trial
Researchers will enroll 17 to 32 patients aged 18 or over with relapsed B-cell CLL or a related cancer called prolymphocytic leukemia. See the list of eligibility criteria at http://cancer.gov/clinicaltrials/CLLRC-OSU-0491.

Study Site and Contact Information
Study sites in the United States are recruiting patients for this trial. See the list of study sites at http://cancer.gov/clinicaltrials/CLLRC-OSU-0491, or call NCI's Cancer Information Service at 1-800-4-CANCER (1-800-422-6237). 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

Joint Research Fellowships in Cancer Available

NCI and the Health Research Board of Ireland have announced a call for applications for the Joint Research Fellowships in Cancer program.

Qualified applicants include postdoctoral researchers in Ireland, Northern Ireland, and the United States working on a defined research project of mutual interest in any cancer-related discipline. Each potential research fellow must apply as part of a team, which should include an Irish principal investigator (PI) and a U.S. PI who is an NCI intramural researcher or NCI grantee.

Fellowships are awarded on a full-time basis over 2 years. Successful applicants will have the opportunity to spend 1 year with an Irish PI and 1 year with a U.S. PI. Up to five fellowships with a start date in 2007 will be awarded. Applicants must be eligible for an appropriate visa.

For more information, visit http://www.hrb.ie/display_content.php?page_id=165 and http://www.allirelandnci.org.

The deadline for this call for applications is September 1, 2006.

Coffee, Tea, & Chats at Mark O. Hatfield Clinical Research Center

Parents and families are welcome to participate in informal chats about the challenges they face while having a child in treatment at NIH's Mark O. Hatfield Clinical Research Center.

Begun by Dr. Lori Wiener of NCI's Pediatric Oncology Branch in September 2005, the chats cover a variety of topics requested by parents, such as creatively managing pain; helping other at-home siblings; nutrition; and dealing with fear, depression, and body image.

In addition to chats in English, some are conducted in Spanish, and others are open forums for families from Spanish-speaking countries.

The chats are held twice a week from 1:30 to 2:30 p.m. in 1-NW Pediatric Unit Family Room. A calendar of chats can be found outside of the clinic and 1-NW.

For additional information, please contact Dr. Wiener at 301-451-9148.

IARC Welcomes India and Korea

At its meeting on May 18, the Governing Council of the International Agency for Research on Cancer (IARC) officially greeted the Republic of India and the Republic of Korea as its 17th and 18th Participating States.

India has a long tradition in the study of cancer, and has recently made significant investments in cancer research and biotechnology. Because the population of India is growing and aging, even if the risk of cancer remains constant, there is potential for a large increase in cancer incidence. Thus, effective cancer prevention is currently a top priority.

The Republic of Korea has experienced rapid economic and social development, and cancer research and treatment have evolved rapidly. The National Cancer Centre in Seoul has excellent clinicians and researchers, and the country continues to make important investments in cancer. ◆

(Spotlight continued from page 3)

"This is a complete turnaround in how people think about targeted therapies," he says.

Another factor driving interest in multitargeted drugs is economics. "Companies realize that if they can get away with a less specific drug, they might have a bigger market for it," says Dr. Druker.

Meanwhile, studies have suggested that some targeted drugs hit targets they were not intended to hit. Rather than seeing this as a design flaw, however, some view the ability to bind multiple proteins—a trait known as promiscuity—as an asset.

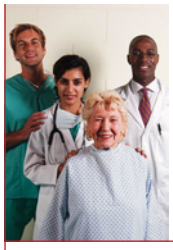
"Promiscuity can be a virtue," says Dr. Longgui Wang of the New York University School of Medicine, who has written about promiscuous drugs. "Cancers often have a number of abnormalities, and we have found that in these cases single-target drugs produce poor results."

Dr. Wang and others are now asking a question that will be explored in the years ahead: What is the best strategy for treating cancer—using multitargeted drugs or combining single-target drugs into "cocktails" like those used to treat HIV/AIDS?

The decisions will be made based on a mixture of efficacy, safety, tolerability, and even cost, says Dr. Demetri. He has programs testing a combination of three single-target inhibitors and others using promiscuous drugs designed to hit multiple pathways at once.

"We haven't made a decision yet, and in the end, we'll let the data speak for itself," he says. ◆

By Edward R. Winstead



Cancer Center Profile

The UC Davis Cancer Center

Director: Dr. Ralph deVere White • 4501 X Street, Sacramento, CA 95817 • Phone: 916-734-5800 • Web site: http://cancer.ucdmc.ucdavis.edu

Background

UC Davis Cancer Center is a program of the University of California, Davis School of Medicine and Medical Center, one of five academic medical centers in the University of California system. UC Davis Cancer Center is the only NCI-designated Cancer Center serving California's Central Valley and northern inland counties, a region of six million people. The Cancer Center diagnoses more than 2,000 cancers, and treats more than 9,000 children and adults each year. Its cancer research program comprises 180 scientists at UC Davis and Lawrence Livermore National Laboratory, with $74 million in annual extramural research funding.

Patient Care

Patients are treated by multidisciplinary teams of surgical, medical, and radiation oncologists, as well as supportive care specialists such as genetic counselors, nutritionists, and social workers. Patients also have access to comprehensive medical care from experts in all medical disciplines. UC Davis Cancer Center is noted especially for its treatment of prostate and bladder cancers, head and neck cancer—especially skull base cancer—melanomas, surgical interventions for pancreatic cancer, experimental therapies for lung cancers, and treatment of leukemia and lymphomas.

The center participates in the Southwest Oncology Group, for which UC Davis is the top-accruing institution; Radiation Therapy Oncology Group; Children's Oncology Group; and the American College of Surgeons Oncology Group. The center also co-leads the NCI-supported California Cancer Consortium in phase I and phase II clinical trials—along with the City of Hope, the University of Southern California, and the University of Pittsburgh—and leads a multi-institutional investigation of simultaneous care in which patients with advanced disease are offered both palliation and participation in clinical trials.

Research Activities

In the first program of its kind, in 2001, UC Davis Cancer Center formed a research program with Lawrence Livermore National Laboratory, emphasizing biomedical technology and cancer biology. UC Davis Cancer Center is known for its cancer biology in animals programs, drawing its strength from the renowned UC Davis School of Veterinary Medicine. In basic science, the center is particularly active in the areas of DNA repair and tyrosine kinases. In therapeutics, the center is a national leader in combinatorial chemistry techniques for drug discovery and provides national leadership in correlative science. It also has the nation's oldest, continuous project in radioimmunotherapy. And in the field of prostate cancer research, the center has made significant progress evaluating apparent benefits of a soy derivative for chemoprevention, as well as gain-of-function studies of mutant p53.

Other Notable Programs

The UC Davis Cancer Center is home to the Asian American Network for Cancer Awareness, Research and Training, an NCI-funded program that researches cancer awareness among, and offers cancer-control training to, Asian American communities in major cities across the country. UC Davis Cancer Center is also developing novel materials for educating Native American women about breast cancer; these materials will eventually be available online and in DVD format. In addition, the center maintains an active patient education program that offers lectures, art therapy, fitness classes, and survivors' events. ◆

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. Contact the *NCI Cancer Bulletin* staff at ncicancerbulletin@mail.nih.gov.