

PREMIERE  
ISSUE

FOX CHASE CANCER CENTER  
**forward**  
Spring 2009



Teamwork and  
Tropical Minnows:  
Tackling Tough Cancer Questions

New Facility for  
World-Class  
Radiation  
Therapy



The Inside  
Story of a  
Nobel Prize



Personalized  
Medicine:  
Has the Future  
Arrived?



## for•ward:

1. situated in the front
2. moving ahead
3. pertaining to the future

# FOX CHASE CANCER CENTER

**MICHAEL V. SEIDEN, M.D., Ph.D.**  
*President and Chief Executive Officer*

**JILL A. MARSTELLER**  
*Senior Vice President  
and Chief Development Officer*

**FRANKLIN HOKE**  
*Assistant Vice President for Communications*

Fox Chase Cancer Center is one of the leading cancer research and treatment centers in the United States. Founded in 1904 as one of the nation's first cancer hospitals, it was also among the first institutions to earn the prestigious comprehensive cancer center designation from the National Cancer Institute. Today, Fox Chase provides leading-edge treatment, conducts world-class research, and offers special programs in cancer prevention and detection, as well as community outreach.

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1-888-FOX CHASE (1-888-369-2427) • [www.fccc.edu](http://www.fccc.edu)

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# forward

SPRING 2009

## EDITOR

Abbey J. Porter

## CONTRIBUTING WRITERS

Lisa Bailey  
George Beschen  
Jill Horne  
Greg Lester  
Diana Quattrone  
Susan Tobin

## DESIGN

Karlyn Rosen Aires  
Cover by AcquireVisual.com

## PHOTOGRAPHY

Paul Cohen  
Tommy Leonardi  
Lien/Nibauer Photography

## ILLUSTRATIONS

Headcase Design

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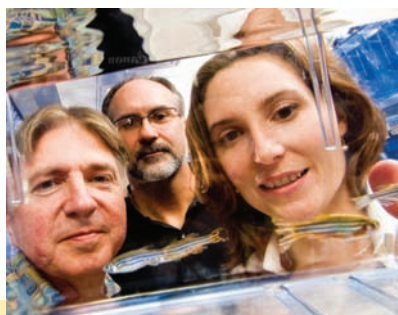
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**ON THE COVER: Team Science**

With the help of team spirit, technology, and tropical minnows, top Fox Chase scientists and physicians are tackling complex cancer problems. *Photo by Tommy Leonardi*

*Story on page 4*

## EMBRACING POSSIBILITY

This is a time of great need—and of great hope. Never has cancer care been so critical: Cancer is on pace to become the No. 1 cause of death worldwide by 2010. But at the same time, I feel tremen-

dous optimism and excitement about the possibilities that lie before us.

We stand at the cusp of a new era in cancer treatment. Thanks to enormous scientific progress in recent years, we have more data at our fingertips than ever before—data that can help us understand the basis of human disease—and powerful new technologies that will enable us to turn that information into effective new cancer therapies.

Fox Chase Cancer Center is poised to embrace these opportunities. The Center has a longstanding tradition of leading the charge against cancer. It was one of the nation's first cancer hospitals, and our doctors and scientists have distinguished themselves with the highest honors in their fields. In these pages, you will read about people like Baruch Blumberg, one of Fox Chase's Nobel Prize winners, whose groundbreaking work has saved countless lives. You will also read about people like Art and Curt McKee, whose lives were touched by the leading-edge care they received as Fox Chase patients.

Fox Chase is building an even stronger future. The Center is constantly seeking new

ways to unite discovery and technology to improve the lives of those who come to us for care. Our innovative Keystone Programs for Collaborative Discovery, featured in this

issue, are bringing the best minds in science and medicine together to investigate key cancer questions. And our dedicated physicians and researchers continue to work to save lives and reduce the suffering caused by cancer.

Finally, I never forget that cancer is personal. The doctors, nurses, scientists, and administrators who choose to work at Fox Chase do so because they are passionate about contributing to the pioneering discovery and compassionate care that help those dealing with cancer today—and those who may face cancer in the future.

I hope this inaugural issue of *Forward* magazine will both inform and inspire you—and illustrate why there is growing reason for hope in the fight against cancer.



MICHAEL V. SEIDEN, M.D., Ph.D.  
President and Chief Executive Officer

*We stand  
at the cusp  
of a new era  
in cancer  
treatment.*



Scott Nibauer

# NEW BOARD CHAIRMAN ELECTED

DAVID MARSHALL SEES CANCER RESEARCH AS LONG-TERM INVESTMENT

**DAVID G. MARSHALL**, who took office as chairman of the Fox Chase board of directors in February, feels passionately about the future of cancer research. A successful entrepreneur, he knows it's important to view the support of such research from a long-range perspective.

As federal officials work to restore the health of our economy in the short term, he says, "I hope they will also keep their sights on the importance of long-term investment in the future of our country. One of the best examples of this kind of investment is cancer research, which requires years of steady support but offers great return on investment in the form of a healthier workforce and high-quality jobs in the emerging economy."

A member of the Fox Chase board since 1994, Marshall was elected in October to succeed William J. Avery, who remains a board member after stepping down as chairman.

"Cancer has had a profound impact on my family," Marshall notes. "My mother and all five of her sisters died of cancer. I am not in a position to find the cure, but I am determined to do whatever I can to help Fox Chase do so."

Marshall is chairman and chief executive officer of Amerimar Realty Company, which he founded in 1987. Amerimar has commercial and residential holdings throughout the country and is particularly well known for its successful development of The Rittenhouse, which includes condominiums and hotel and restaurant facilities, in Center City Philadelphia.



"I am not in a position to find the cure, but I am determined to do whatever I can to help Fox Chase do so."

"After the able, confident leadership we've enjoyed from Bill Avery, we are fortunate to have another talented leader step forward at this time of great opportunity for Fox Chase Cancer Center," says Michael V. Seiden, president and chief executive officer. "David Marshall has the optimism, strength, and vision to help Fox Chase expand in the coming years to build on its national leadership position in cancer research, prevention, and treatment." ■

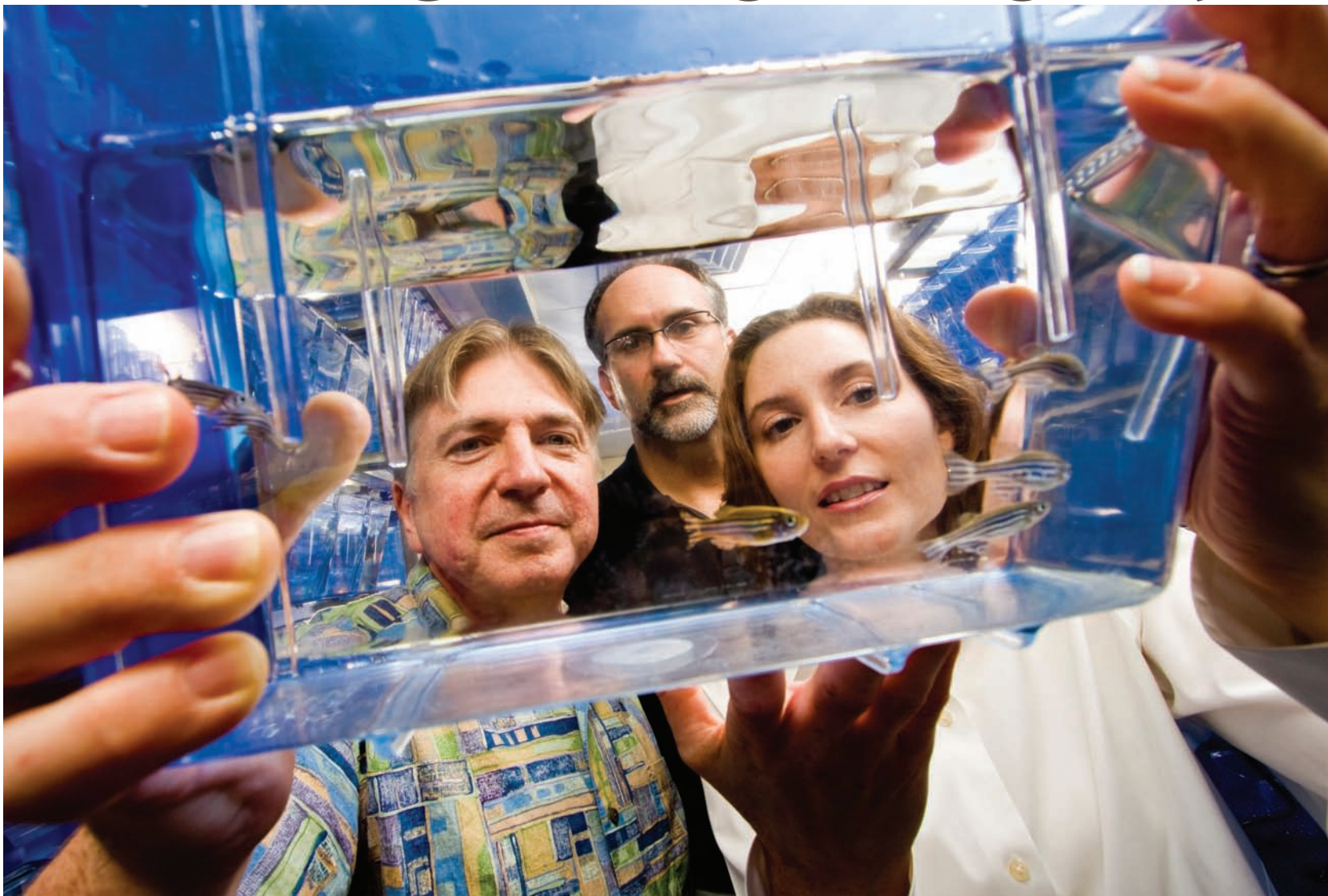
## Louis Della Penna Elected Vice Chairman

Louis E. Della Penna Sr. has been tapped to succeed David G. Marshall as a vice chairman of the Fox Chase board of directors. Elected to the board in October 2007, Della Penna joins fellow vice chairmen W. Thacher Brown, Thomas W. Hofmann, and Peter McCausland.

Founder and retired chairman of LDP Consulting Group Inc., a New Jersey-based employee-benefits consulting company, Della Penna is a thought leader on topics related to health-care cost containment.

Della Penna created the Carol and Louis E. Della Penna Endowed Fund in Urologic Cancer Research and the John A. Ridge, M.D., Ph.D., Endowed Surgical Oncology Fellowship at Fox Chase. His interest in the Center stems from his firsthand experience as a Fox Chase patient and cancer survivor. "From a humanitarian standpoint, it's so important to support cancer research," he says.

# HARNESSING TEAM SCIENCE TO FIGHT CANCER



KEYSTONE PROGRAMS AIM  
TO ANSWER TOUGH QUESTIONS

By Franklin Hoke Photos by Tommy Leonardi

# O

## ne August evening last summer, about a hundred small tropical minnows called zebrafish traveled down I-95

from the Dana-Farber Cancer Institute in Boston to Fox Chase Cancer Center in Philadelphia.

Shepherded by developmental biologist Jennifer Rhodes, herself recently arrived at Fox Chase from Dana-Farber, the fish rode in a plastic bag of water nestled into a tub in the back seat of Rhodes' car. They were to be the founding residents of a new facility for studying the genetics of leukemias, lymphomas, myelomas, and other cancers of the blood, with the aim of developing new treatments.

The need for the research is clear: The blood cancers account for almost 10 percent of cancer deaths, and leukemia causes more deaths than any other cancer among children and adults under 20.

Rhodes was concerned about the effect of travel on the fish. Would they fall ill? Would they stop eating? Would they fail to breed, effectively ending the research project before it began? "I was a little stressed, driving," she recalls. "I worried about hitting every pothole!"

Fortunately, almost all of the fish survived. They were joined a few weeks later by about 500 more. Today, Rhodes' thriving facility is the linchpin in one of four new research programs known collectively as the Keystone Programs for Collaborative Discovery. Launched early last year, the programs bring the power of team-based science to bear on some of the most significant questions in cancer research, with the goal of accelerating medical progress against cancer.

At the heart of each Keystone Program is a self-organized group of scientists, clinicians, and other research professionals seeking to focus their shared expertise on an important cancer challenge. Each program was selected for support through a competitive external review by a panel of top cancer researchers.

"The most important problems in cancer today are too complex to be solved by individual researchers working in separate disciplines," says Michael V. Seiden, president and chief executive officer. "In the post-genomic era, the next wave of major advances against disease will depend on self-assembled teams of researchers from different fields effectively pooling their skills and resources. The Keystone Programs were designed specifically to encourage and support that kind of creative team-based science."



### ZEBRAFISH AND BLOOD CELLS

Rhodes is a member of the Keystone Program in Blood Cell Development and Cancer, led by investigators David L. Wiest and Richard R. "Randy" Hardy.

Blood cells are vulnerable to genetic mutations that can trigger blood cancer, particularly as they develop from progenitor or stem cells into fully differentiated cells with specific duties. The program focuses on understanding these changes. Wiest is an expert in the development of blood cells called T cells, while Hardy specializes in B-cell development and Rhodes studies the development of myeloid cells. Other researchers study additional blood-cell types, and the program's clinical members help to assess which investigations might form the basis of new treatments.

So what can zebrafish tell scientists about human blood cancers?

"It's actually pretty amazing," Rhodes says. "These little fish have the same types of blood cells that we have. So we can use them to better understand the normal development of these cells—and what's gone wrong when the cells become leukemic."

The availability of new laboratory technologies helps to set the stage for significant progress over the next several years. "We have powerful new tools for gene discovery at hand and a team of researchers committed to systematically studying, gene by gene, the required steps for blood cell development," Hardy notes.

Wiest adds: "With the in-house expertise at our disposal, Fox Chase is uniquely positioned to advance the understanding of normal blood-cell development and the development of blood cancers."

## PERSONALIZED PREVENTION

A major theme of the Keystone Programs is the development of personalized approaches to cancer prevention and treatment. The Keystone Program in Personalized Risk and Prevention aims to accelerate the discovery of biomarkers—molecular markers that signal the onset of cancer—and develop individually tailored risk reduction strategies.

The initiative draws on the strength of Fox Chase's highly successful risk assessment and prevention research programs. The Margaret Dyson Family Risk Assessment Program, established in 1991, helped to make Fox Chase an international leader in detecting genetic cancer risk and providing counseling on risk reduction. The program has compiled information on more than 10,000 families who are at increased risk of breast or ovarian cancer. The Center also offers risk assessment programs for prostate, skin, and gastrointestinal cancers. (*For more on Fox Chase's risk assessment programs, see page 20.*)

"We're getting a much more sophisticated handle on how to evaluate an individual's risk, but the challenge is what to do about that risk," says Dyson program founder Mary B. Daly, who leads the Keystone Program. "We want to be able not only to tell someone what their true risk is but also to prevent the cancer."

The Center's Chemoprevention Research Program was one of the first programs in the nation dedicated to establishing biomarkers of cancer susceptibility and identifying drugs and other agents that might prevent cancer in high-risk individuals.

Chemoprevention program leader Margie L. Clapper also co-leads the Keystone Program. "We have a lot of data that suggests the majority of cancers can be prevented through interventions of various kinds," Clapper says. "So it is an exciting challenge for us to try and figure out how to prevent them."

## A FOCUS ON KIDNEY CANCER

The Keystone Program in Personalized Kidney Cancer Therapy aims to develop individualized anti-cancer strategies that target kidney cancer. It is led by Robert G. Uzzo, chairman of the department of surgery; Gary R. Hudes, director of genitourinary malignancies; and cancer geneticist Joseph R. Testa.

While new treatments for kidney cancer have become available in recent years, more than 54,000 patients will be diagnosed with the disease this year, and about 13,000 will die.

This Keystone Program investigates the biological mechanisms that lead to the metastasis, or spread, of kidney cancer with the aim of uncovering molecular signals that can predict how an individual's tumor will respond to therapy. Ultimately, the research will help clinicians to choose the best therapies for each patient based on the molecular characteristics of his or her tumor.

The program depends on a database of clinical information from more than 1,300 Fox Chase patients with kidney cancer—one of the largest such databases in the world. The collection provides biological specimens and data to drive research that, in turn, will produce prototype therapies for possible development into new personalized treatments.

"We envision an ongoing cycle of clinical and scientific advances—a translational research effort built upon years of expertise in patient care and laboratory practice," Uzzo says.

## INSIGHT INTO CANCER'S CAUSES

The Keystone Program in Epigenetics and Progenitor Cells studies two groundbreaking new views of the origins of tumors, with the goal of developing new strategies for diagnosis, treatment, and prevention.

The first view looks at cancer through the lens of a field called epigenetics. Previously, it was thought that tumor cells arise solely from mutations in genes. However, research conducted at Fox Chase and elsewhere has shown that heritable changes in the way genes are turned on or off—changes that don't involve DNA mutations—can also contribute to cancer.

"Epigenetics looks at proteins that control genes that are 'epi'—outside of the genes themselves—but still have a very important role in controlling the function of genes," explains program leader Kenneth Zaret.

The study of epigenetics could open entirely new avenues for cancer treatments.

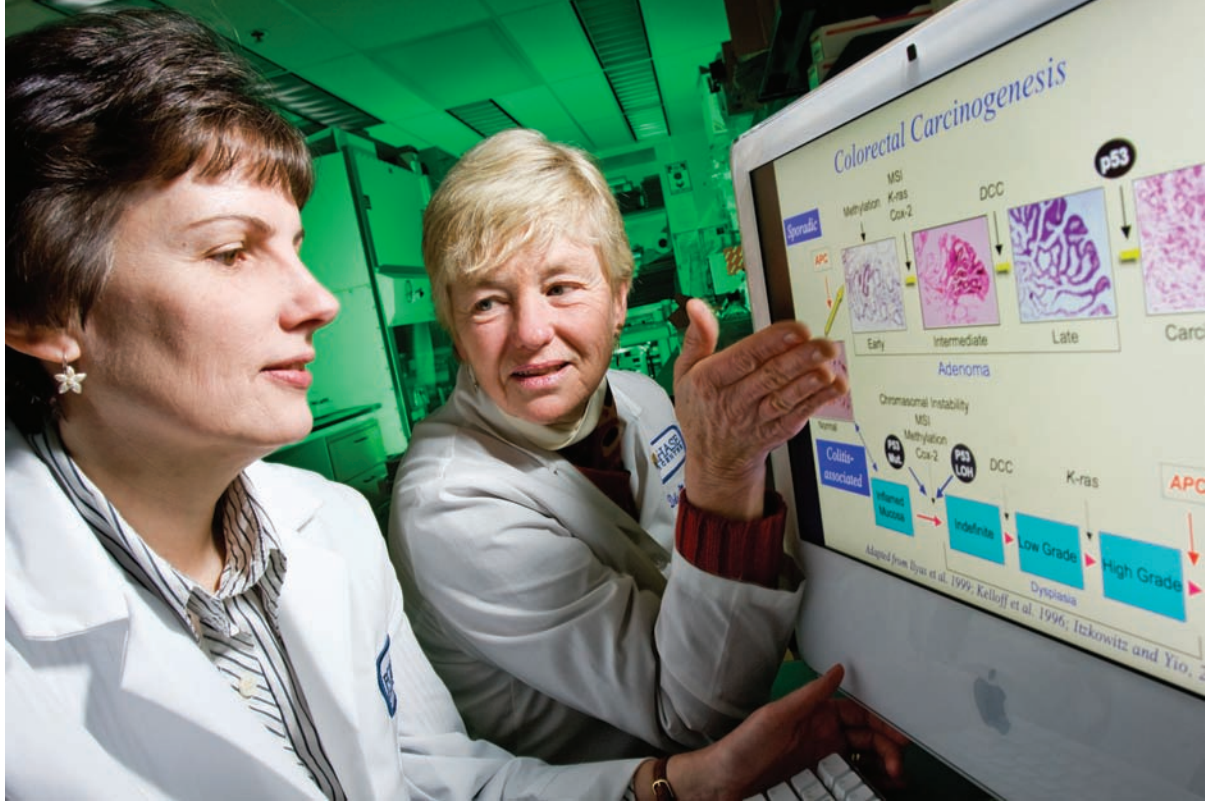
"The traditional approach of cancer treatment has been to kill the cancer cells," says Alfonso Bellacosa, program co-

**"We have a lot of data that suggests the majority of cancers can be prevented through interventions of various kinds. So it is an exciting challenge for us to try and figure out how to prevent them."**

## A FOX CHASE FIRST

**In 1904,** Fox Chase became one of the first cancer hospitals in the nation. It was founded as American Oncologic Hospital. You can learn more about Fox Chase at [www.fccc.edu](http://www.fccc.edu).





Finding ways to detect cancer sooner and help people reduce their risk is the work of scientist Margie L. Clapper, left, and oncologist Mary B. Daly. Clapper and Daly lead the Keystone Program in Personalized Risk and Prevention.

leader. “The novel approach of epigenetics is that of modifying cancer cells, turning them into benign cells. We are not killing cells—we are taming them.”

The program also explores the role of so-called progenitor cells in the genesis of cancer. While the prevailing view has been that all of the cells in a tumor contribute equally to its growth, recent research shows that for many or even most cancers, a subset of cells known as progenitor cells, or cancer stem cells, is disproportionately responsible for tumor formation and maintenance. These cells are typically resistant to current cancer therapies and are often responsible for relapse.

“Progenitor cells are important during embryonic development for building the tissues and structures of the body,” notes program co-leader Fabrice Roegiers. “But some new ideas are that progenitor cells actually contribute to cancer as well. And that’s a very important concept because targeting those progenitor cells may be the key to treating a lot of very aggressive and difficult-to-treat cancers.”

Progenitor cells that have become cancerous usually display epigenetic changes, too, so combining the two research areas produces a program with a unique outlook and potential.

### AN INTERACTIVE CULTURE

Thanks in part to private philanthropy, the first four Keystone Programs each received \$5 million over five years to organize, buy equipment, recruit investigators, and begin pursuit of their goals. As other faculty groups propose creative ways to answer significant cancer questions and additional funding becomes available, new programs will be added.

In line to launch in the next few years are the Keystone Program in Head and Neck Cancer, led by medical oncologist

Barbara Burtness, surgeon John “Drew” Ridge, and molecular biologist Erica Golemis; and the Keystone Program in Cancer Survivorship, being developed under the leadership of Andrea M. Barsevick, director of nursing research.

The Keystone Programs take advantage of the special character of Fox Chase, where leading clinicians and laboratory scientists interact frequently to exchange ideas and insights. Fox Chase’s dual focus on clinical care and scientific research is reflected in its status as a National Cancer Institute-designated comprehensive cancer center. The designation identifies academic medical institutions with unusual quality, breadth, and depth in their approaches to improving cancer research and treatment.

The Center’s comprehensive nature allows for important interaction among researchers and clinicians, says Keystone Program leader David Wiest.

“Early on in my career, I was interested primarily in understanding how basic biological processes worked,” he says. “Now that I’ve become better established, I’ve become much more interested in understanding how those basic findings can impact clinical care. And being at a comprehensive cancer center, I can make that interest a reality.” ■■



#### ON THE WEB

To learn more about the Keystone Programs, including how to support Fox Chase research, visit [www.fccc.edu/research/themes/keystone](http://www.fccc.edu/research/themes/keystone).

# NEW FACILITY TO EXPAND REACH OF WORLD-CLASS RADIATION THERAPY

By Susan Tobin

**M**ore patients soon will enjoy convenient access to Fox Chase's world-class radiation therapy services, thanks to a new facility slated to open this summer. Fox Chase Cancer Center at Buckingham, the Center's first satellite radiation therapy facility, represents one facet of Fox Chase's current growth. Now under construction, the 12,500-square-foot facility will be located in Bucks County, Pennsylvania, about 20 miles north of the main Fox Chase campus in Philadelphia.

In December, Fox Chase shared plans for the facility with community leaders at a reception at the Mercer Museum in Doylestown. Louis E. Della Penna Sr. of nearby New Hope, a vice chairman of Fox Chase's board of directors, made the occasion personal by describing his experience as a Fox Chase



RDLA Architects

Fox Chase Cancer Center at Buckingham, shown here in an artist's rendering, is a satellite radiation therapy facility slated to open this summer in Bucks County, Pennsylvania.

patient. He first visited the Center for a throat problem that turned out to be minor, but attentive Fox Chase doctors discovered that he had stage III kidney cancer—and treated him successfully.

“Without these very special Fox Chase doctors who took a little extra time, I wouldn’t be here,” Della Penna said. “I know how committed the scientists, doctors, and nurses at Fox Chase are to providing top-quality care for people with cancer. So if you or your family ever need that care, it’s great to know you’ll soon be able to have it in your own backyard.”

## Leading-edge technologies

The Buckingham facility will offer patients state-of-the-art treatment with a team of experienced Fox Chase specialists. The center also will feature advanced technologies that improve the precision of radiation therapy and reduce its potential side effects.

***The CyberKnife Robotic Radiosurgery System:*** The first radiosurgery system designed to target tumors anywhere in the body with sub-millimeter accuracy, this tool provides treatment for tumors that cannot be removed surgically. Using image-guidance technology and computer-controlled robotics, the system continuously tracks the tumor and corrects for patient movement throughout treatment.

***Trilogy Linear Accelerator with Rapid Arc:*** Designed to deliver higher radiation doses to smaller areas over a shorter time, the Trilogy linear accelerator makes radiation possible for all types and stages of cancer. The new Rapid Arc technology allows for faster, more comfortable treatment.

***LightSpeed RT 16 CT Simulator:*** An important treatment-planning tool, this computed tomography scanner provides 16 “slices,” or highly detailed images, of the tumor to enable visualization of its smallest anatomic details. It allows for precise treatment planning, including the placement of radiation beams, and respiration-gated therapy, which is timed to the patient’s breathing.

***The Calypso 4D Localization System:*** Part of image-guided radiation therapy for men with prostate cancer, Calypso works like a GPS system that allows the motion of the prostate to be tracked throughout treatment and lets the radiation beam hone in on tiny beacons implanted in the prostate.

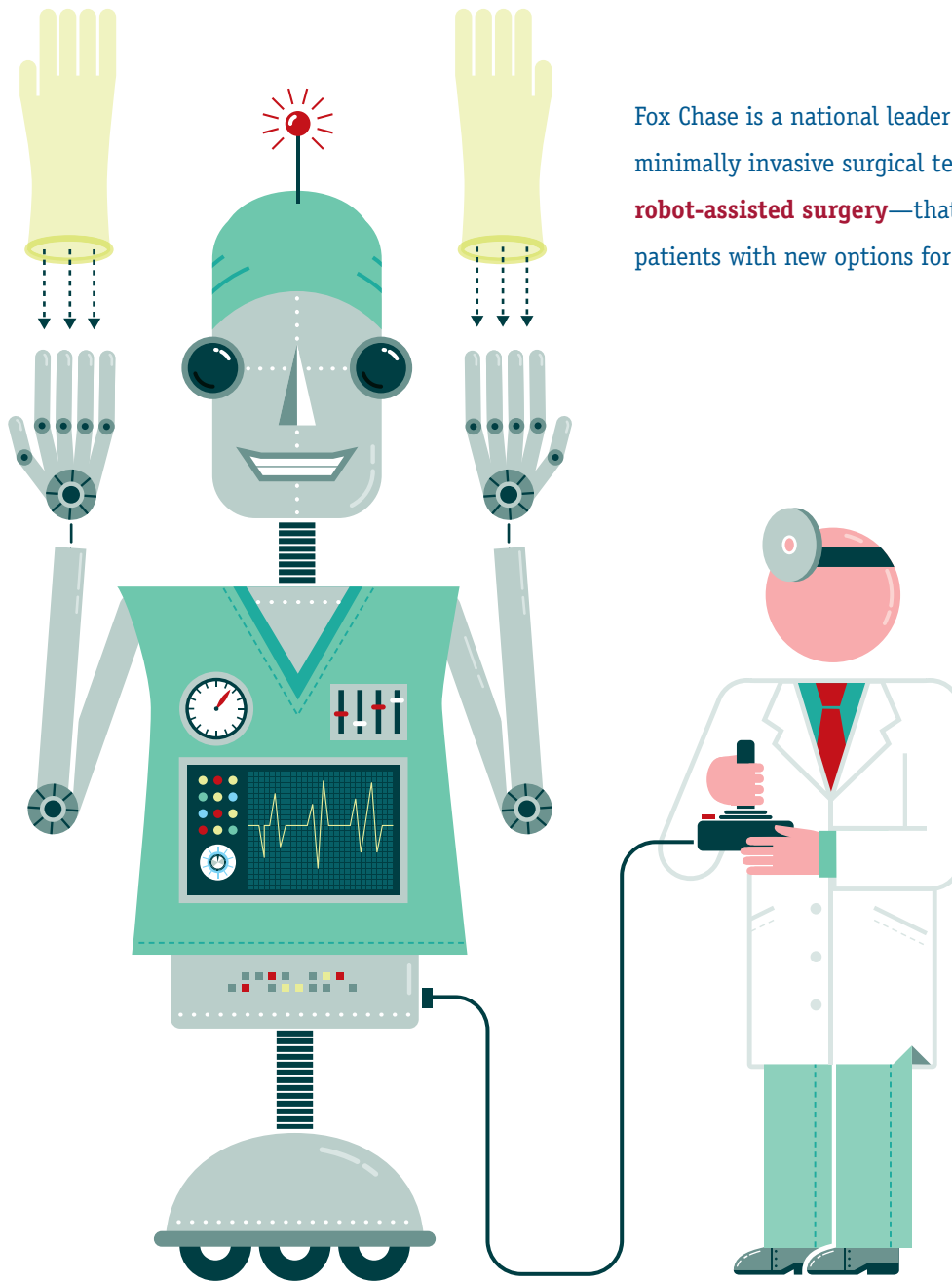
“We’re excited to offer the most advanced, state-of-the-art radiation treatments in Bucks County,” says Eric M. Horwitz, acting chairman of radiation oncology. “This new facility will allow patients in Bucks County and beyond to get the very best treatment closer to home.” ■

## Pioneering the Radiation Treatments of Tomorrow—Today

Fox Chase has pioneered some of the world’s leading radiation therapy tools. Because its radiation oncologists work with the foremost medical physicists and makers of medical equipment to develop new or improved applications of their technology, Fox Chase often can provide these services to patients long before other facilities.

“We’re particularly proud of Fox Chase’s history in radiation therapy,” says Michael V. Seiden, president and chief executive officer. “We’re often first in the country and almost always first in the region to have new technologies that make radiation more effective against cancer cells and less toxic to normal cells.”

- \* **Intensity-modulated radiation therapy:** Fox Chase was the first in the region and one of the first in the country to use IMRT, which shapes the radiation beam to the tumor to avoid damage to normal tissues. Fox Chase doctors are among the nation’s most experienced in using this advanced form of external radiation.
- \* **Ultrasound-guided targeting:** The Center was first in the world to use ultrasound-guided targeting, which benefits prostate cancer patients by zeroing in on the tumor’s exact location during treatment. Many organs, including the prostate gland, shift slightly with the body’s natural movement. The equipment tracks the tumor and delivers radiation precisely to its target.
- \* **Image-guided radiation therapy:** This technology was pilot-tested by Fox Chase and has since become an integral part of radiation treatment. IGRT uses tools such as X-ray images, ultrasound, and CT scans to guide treatment and adjust for patient movement. In 2007, Fox Chase became the first treatment center in the eastern United States to use the Calypso localization system, which provides real-time tracking for IGRT.
- \* **Magnetic resonance imaging:** Typically used for diagnosis, MRI allows precise planning of intensity-modulated radiation therapy. Fox Chase was the first in the world to use a dedicated MRI unit for radiation treatment planning.
- \* **High-intensity focused ultrasound:** Fox Chase was the first in North America and remains one of only a few in the world to use a HIFU unit for cancer treatment. Currently being tested in clinical trials to relieve pain from cancer that has spread to the bones, HIFU uses sound waves to create heat that destroys cancer cells with great precision. *(For more information, see page 33.)*



Fox Chase is a national leader in the use of minimally invasive surgical techniques—including **robot-assisted surgery**—that provide cancer patients with new options for treatment.

# The Kindest Cut

Innovative new surgical techniques pay off for patients

By Lisa Bailey Illustration by Headcase Design

**I**n October 2007, William Krassan was experiencing abdominal pain and discomfort. His family doctor suggested a CT scan to help diagnose the problem.

Krassan was shocked by the results.

“Not only was I stunned to hear I had kidney cancer, I had different types of cancer in each kidney,” he recalls.

The diagnosis was particularly frightening because Krassan knew that while he could survive with one kidney, he couldn’t live normally without both.

A friend recommended he visit Fox Chase for a consultation. There, Krassan met surgeon Rosalia Viterbo, who explained the advantages of robot-assisted surgery. The da Vinci® Surgical System—known simply as “the robot”—is among the advanced new tools helping Fox Chase surgeons operate with pinpoint accuracy and minimal incisions.

Robot-assisted surgery is a type of laparoscopic procedure, in which the surgeon inserts a viewing instrument called a laparoscope through a small incision. In robotic surgery, the instruments are held by a robot that is controlled by a surgeon seated at a console. A high-definition, three-dimensional vision system provides a magnified view of the surgical site.

Minimally invasive techniques like robotic surgery are changing the face of cancer treatment. Less physically traumatic than conventional surgery, these innovative procedures offer patients fewer complications and quicker recoveries.

### A pioneer in cancer treatment

Minimally invasive techniques, though commonly used for procedures such as gallbladder removal, are not yet widely used to treat cancer. However, Fox Chase’s specially trained surgeons, who are national leaders in these practices, perform complex minimally invasive surgeries on patients with a variety of cancers.

“Fox Chase is among only a handful of institutions worldwide using robotics or laparoscopy to treat patients with nearly all types of cancer, including prostate, kidney, bladder, colon, head and neck, uterine, liver, stomach, pancreatic, and thoracic tumors,” says Robert G. Uzzo, chairman of the department of surgery.

Viterbo explained the benefits of minimally invasive surgery to Krassan: With conventional surgery, he probably would need at least four months to heal from surgery on one kidney before the operation on the other, giving the cancer more time to grow and spread. Robotic surgery would allow Viterbo to perform the two procedures just eight weeks apart, and the precision of the robot would enable her to remove the cancer while protecting nearby healthy tissue and preserving kidney function—a key factor, with both kidneys involved.

Krassan was convinced. He underwent robotic surgery, with excellent results. Even during recovery, he had the full use of his kidneys without the need for dialysis.

“The procedure and recovery were fairly painless and easy,” Krassan recalls. “Dr. Viterbo was able to save 90 percent of my right kidney and two-thirds of my left kidney. I am forever grateful.”

Viterbo also was able to speed Kenneth Ward’s return to day-to-day life after bladder cancer. Ward’s condition required the removal of his entire bladder and lymph nodes and the construction of a new bladder—a procedure called neobladder surgery. Before robotic surgery was an option, the recently retired teacher would have had to undergo conventional, open surgery requiring a large incision and long recovery period—and possibly the need to wear a bag for urine drainage.

With the help of the robot, Viterbo performed a successful bladder removal and reconstruction. “I was able to do the entire procedure through a 4-centimeter incision and discharge Ken from the hospital in less time—and, most importantly, with a functioning new bladder and excellent cancer control,” she says.

Viterbo and her colleagues are experienced in surgeries like Ward’s. “Fox Chase is one of the leading hospitals in the nation for robotic urologic surgery,” Uzzo notes. “Every urologic oncologist is trained to use the robot, and we have more robotically trained, fellowship-certified cancer surgeons than any institution in our region.”

### PREVIEW

- ▶ **Minimally invasive surgery** requires only small incisions, if any—unlike conventional surgery, in which surgeons may cut substantial skin and tissue.
- ▶ **Leading-edge techniques** in minimally invasive surgery include the use of robots, lasers, tiny video cameras, and other specialized instruments.
- ▶ **Benefits to patients** include less pain, bleeding, and scarring; faster recovery; and preserved function.

## Fox Chase is among only a handful of institutions worldwide using robotics to treat patients with nearly all types of cancer.

The robot is also used for almost all types of gynecologic cancer surgeries at Fox Chase, adds Mark A. Morgan, chief of gynecologic surgical oncology: “With its instrumentation and ability to improve magnification, we can often do the more complicated cases more precisely and minimize the side effects of radical surgery.”

In addition to using the robot, Fox Chase surgeons practice other laparoscopic procedures in which the surgeon inserts instruments through a “keyhole” incision near the belly button; transoral laser surgery, in which an instrument inserted through the mouth uses a laser to break up the tumor; and video-assisted thoracic surgery, in which surgeons insert a camera and thin instruments through small incisions between the ribs.

### Less pain, better outcomes

Fox Chase surgeons are experienced in the use of video-assisted thoracic surgery, or VATS. Thoracic surgeons, who treat organs inside the chest, use VATS most often to remove a lobe of a cancerous lung.

Conventional lobectomies usually require a 6- to 10-inch incision, the cutting of the major chest muscles, and the spreading or removal of ribs. With VATS, the surgeon accesses the chest by making two to four small incisions and inserting a video camera and surgical instruments between the ribs.

“These patients do very well,” notes Walter J. Scott, chief of thoracic surgery. “They typically go home after two or three days, have less pain, and recover much faster.”

“Removing all of the cancer is always our main goal, and VATS allows us to do that with less patient discomfort than open surgery.”

Scott and his colleague, Abraham “Avi” Lebenthal, are experts in VATS and other types of minimally invasive thoracic surgery. Lebenthal is one of only a few surgeons in the country to perform minimally invasive esophagectomies—removal of the esophagus—for patients with esophageal cancer. In a conventional esophagectomy, the surgeon makes large incisions in the abdominal wall and between the ribs. VATS not only requires smaller incisions but also produces fewer complications and better outcomes.

### TERMS DEFINED

MINIMALLY INVASIVE SURGICAL TECHNIQUES INCLUDE:

- \* **Laparoscopic surgery:** The surgeon inserts a small, telescope-like viewing tube called a laparoscope, as well as surgical instruments, through a “keyhole” incision near the belly button. The surgeon manipulates the instruments while viewing a magnified surgical field on a video monitor.
- \* **Robotic surgery:** The da Vinci® Surgical System provides the “next generation” of laparoscopic surgery. A robot’s arms hold the surgical tools, which the surgeon controls while seated at a console—a system that provides for greater dexterity. A magnified, three-dimensional view of the surgical field allows the surgeon to see better and be more precise.
- \* **Transoral laser surgery:** Entering the body through the mouth, rather than an incision, the surgeon uses a lighted viewing tube called an endoscope to reach the tumor. Laser energy delivered via the endoscope breaks the tumor into small pieces that are removed a little at a time.
- \* **Video-assisted thoracic surgery:** VATS is similar to laparoscopic surgery in that a video camera and thin instruments are inserted through small incisions. With VATS, however, they are inserted between the ribs. Surgeons use the technique to reach tumors in the lungs and esophagus. Before VATS, surgeons had to cut into major chest muscles and sometimes break or remove ribs.

## Surgery without incisions

Transoral laser surgery is considered the latest advance in treating head and neck cancers, which often arise in hard-to-reach areas. Surgeons reach the tumor through the patient's mouth and use a laser to break it up for removal; no incision is needed.

The technique has many benefits. Conventional surgery to treat cancers of the throat, larynx, or mouth can interfere with patients' ability to swallow, speak normally, or eat solid foods. In the period immediately following conventional surgery, some patients need feeding tubes or tracheotomies—a surgical procedure that opens a direct airway in the windpipe—because of swelling in the throat.

"It is a great feeling to be able to provide this service to my patients," says head and neck surgeon Miriam N. Lango. "Less invasive surgery for deep-seated tumors offers patients an easier recovery and is often done without the need for feeding tubes or tracheotomy."

Charlie Osborne is one patient who benefited from this technique. In 2005, Osborne found out he had cancer of the larynx. After learning he might be a candidate for laser surgery, he made an appointment with Lango.

The surgeon performed the procedure, which was a success. "The tumor was completely removed without affecting critical nerves and blood vessels," she says.

Lango notes that Osborne, like other transoral surgery patients, experienced less swelling and scarring, and had a much lower risk of infection, than is typical with conventional surgery.

"It was a huge relief to learn that I didn't have to have open surgery on my neck," Osborne says. "I recovered very quickly, felt great, and was able to return to work sooner than I expected."

"Our goal is to cure cancer while preserving the best possible quality of life," Lango says. "This is now possible for many patients using techniques like transoral laser surgery."

## Experience and expertise

Fox Chase continues to strengthen its leadership and expertise in innovative cancer treatments like minimally invasive surgery.

"Fox Chase is one of only a few cancer centers in the country to focus on minimally invasive approaches to can-



Scott Nibauer

Members of the Fox Chase surgical team monitor a patient during a robot-assisted surgery. Use of the robot can help surgeons be more accurate and speed recovery for patients.

cer therapies," notes Andrew A. Gumbs, who recently joined Fox Chase as director of minimally invasive hepato-pancreato-biliary, or HPB, surgery. "In my new role at Fox Chase, I plan to expand this exciting new field, which offers so many benefits to patients."

In the meantime, conventional surgery continues to play an important role in cancer treatment. Despite advances in minimally invasive techniques, many complex cases still require open surgery, depending on the size and location of the tumor. Fox Chase specializes in such cases.

"Patients who are told elsewhere that their tumor might be inoperable may find that a Fox Chase surgeon can do the operation successfully because we have more experience with complicated cases," says gastrointestinal surgeon James C. Watson. "With experience comes better outcomes. Fox Chase surgeons have that experience. Our patients, in turn, feel more confident going into surgery." ■



### ON THE WEB

To read more about the patients featured in this article and other Fox Chase success stories, visit [www.fccc.edu/WhyChoose/SuccessStories](http://www.fccc.edu/WhyChoose/SuccessStories).



Tommy Leonard

To determine why some patients with colorectal cancer respond to a particular drug while others don't, oncologist Neal J. Meropol, left, works with researcher Andrew K. Godwin.



# PERSONALIZED MEDICINE: HAS THE FUTURE ARRIVED?

By Greg Lester

“Personalized medicine”—the concept of using genetic information to tailor medical care to each patient’s specific needs—is usually thought of as a future possibility. But that possibility is becoming a reality at Fox Chase, where researchers and physicians have played a lead role in a scientific breakthrough that has improved the treatment of patients with colorectal cancer. Their achievement is helping to save lives—and changing the face of cancer medicine.

For years, the phrase “personalized medicine” has represented little more than a pipe dream of a time when a simple blood test could direct an entire course of treatment. A blood scan for genes, proteins, and other molecules could determine the specific nature of a person’s cancer, for example, and allow physicians to select the therapy that would work best for that patient. Someday, its proponents claim, such personalized care will lead to earlier and more successful treatment of cancer and other diseases.

In the case of colorectal cancer, that day may already be here, thanks to groundbreaking research by Fox Chase scientists and physicians.

Neal J. Meropol, director of the Gastrointestinal Cancer Program and the Gastrointestinal Tumor Risk Assessment Program, has pioneered personalized medicine as part of his everyday practice in the treatment of metastatic colorectal cancer, a disease that claims nearly 50,000 lives each year in the United States.

“The first crack you take at metastatic colorectal cancer provides the best chance of beating the disease,” Meropol says. “Right now, we have an arsenal of drugs to choose from—including traditional chemotherapies and targeted pharmaceuticals—but you need to pick the right one or combination as early as possible to get the most benefit for the patient.”

Until very recently, there was no reliable means of determining which therapeutic weapon would provide the best first option for a given patient. Just five years ago, speaking at the annual meeting of the American Association for Cancer Research, Meropol posed the question: Could a patient’s unique biology—or even the biology of a tumor itself—dictate how his or her cancer should be treated? The answer was critical to the viability of a new drug for metastatic colorectal cancer called cetuximab, known by the trade name Erbitux. The treatment had shown tremendous promise in clinical trials—but only for a select few. Cetuximab was a potential boon for patient care, Meropol knew, but how

could physicians identify those for whom it would work best?

Just a few years later, Meropol answered his own question. In 2007, the clinical researcher and his Fox Chase colleagues, along with collaborators from around the country, published a study in *Journal of Clinical Oncology* demonstrating that patients with a mutation in a gene known as K-RAS are less likely to respond to cetuximab. Meropol also co-authored a later study showing that the K-RAS mutation also predicts response to a related drug, panitumumab—known as Vectibix—which works in much the same way as cetuximab.

Today, Fox Chase patients with metastatic colorectal cancer are routinely screened for the K-RAS mutation. The research finding has been “wholly integrated into patient care at Fox Chase,” Meropol says. “In fact, I’d say that it is now inappropriate to prescribe cetuximab or panitumumab without first testing for K-RAS mutations. Period.”

#### UNDERSTANDING A DISEASE

Both cetuximab and panitumumab were designed with a single goal in mind—to block a cell-surface receptor called epidermal growth factor receptor, or EGFR, which is an important driver of cancer growth. The drugs consist of antibodies that bind to and inactivate EGFR.

In nature, antibodies tag specific foreign particles in the body, such as viruses or bacteria, for destruction by the immune system. Laboratory researchers can manufacture antibodies designed to bind to a specific target—in this case, EGFR. (These “monoclonal antibodies,” as they are known, are the source of the “mab” suffix in the names of the drugs.)

EGFR plays a central role in cell biology: It serves as an “on switch” on the surface of many cells that tells the cell to divide. In the case of certain colorectal and head and neck cancers, the EGFR switch is continually on, leading to the out-of-control cell growth that is the hallmark of cancer. In theory, anti-EGFR antibodies should block the on switch,

preventing chemical signals from reaching EGFR and, therefore, preventing the cell from multiplying.

For patients who benefit from cetuximab and panitumumab, this is indeed what the drugs do, and quite effectively. In 2004, the Food and Drug Administration approved cetuximab for the treatment of patients with colorectal cancers whose tumors tested positive for EGFR. However, that test proved ineffective: For most patients with the receptor, cetuximab had little or no effect, and some patients who

**“NOW MORE THAN EVER,  
industry and academia must identify,  
recognize, and pursue shared goals  
regarding the clinical development of  
personalized treatments.”**

failed the test still responded to cetuximab. Apparently, simply testing for EGFR was not enough.

Cancer medicine had a good drug at its disposal, Meropol recalls, but the science was not yet clear on who should receive that drug. To help identify the right patients, Meropol turned to colleague Andrew K. Godwin, director of Fox Chase’s Clinical Molecular Genetics Laboratory, a facility uniquely suited to surveying the genes of patients who were cetuximab-indifferent.

Godwin established the laboratory to analyze mutations of the BRCA1 and BRCA2 genes involved in hereditary forms of breast and ovarian cancer, and the facility now performs that type of analysis on a wide variety of human genes. For their 2007 study with Meropol, Godwin and his team studied tumor biopsies taken from 110 patients with metastatic colorectal cancer before they were given cetuximab. Scanning the biopsies for genes and mutations that might explain why patients responded differently to the drug, they found that patients without the K-RAS mutation were much more likely to respond to treatment: Cetuximab checked tumor growth in nearly half of those patients, as opposed to only 10 percent of patients with the mutant gene.

K-RAS is a member of a gene family well known to cancer researchers. The proteins these genes produce are part of the chain of molecules that communicates signals from outside the cell—from EGFR on the cell surface, for example—

#### A FOX CHASE FIRST

**In 1974,** Fox Chase Cancer Center became one of the first institutions to receive the National Cancer Institute’s elite designation of comprehensive cancer center—a status that recognizes excellence in both research and clinical care.

to the nucleus, which contains the cell's genetic information. The overall chain, or pathway, has evolved to allow factors outside the cell to dictate which proteins the cell should make and when.

In the case of some colorectal cancers, the researchers found that the mutation in the K-RAS gene somehow activates growth signals, regardless of whether EGFR is present. "Although we don't fully understand all of the factors that contribute to this disease," Godwin says, "it is apparent from our studies that a significant number of colon tumors are being driven by mutated K-RAS."

### A NEW PARADIGM FOR CANCER MEDICINE

K-RAS mutations allow physicians to identify the subset of patients who won't benefit from EGFR inhibitors like cetuximab and panitumumab. They do not indicate for certain which of the remaining patients will benefit, but excluding the patients who shouldn't have the treatment is a big first

step in personalizing colorectal cancer treatment, Meropol says. It also represents a new way of thinking about drug development.

"Now that we're shifting the personalized medicine paradigm into practice, we'll need to think about what targeted therapies mean for the future," he says. "Overall, this is a great thing for patients. They benefit from more effective treatment with fewer side effects."

The implications of the paradigm shift for the pharmaceutical industry remain unclear, since personalized medicine essentially narrows a given drug's potential market. How that might affect drug pricing and the enormous cost of drug research has yet to be determined.

"Now more than ever, industry and academia must identify, recognize, and pursue shared goals regarding the clinical development of personalized treatments," Meropol notes. "Personalized medicine is here, but this is still just the beginning." ■



HeadCase Design

# EXECUTIVE POWER

FOX CHASE PARTNERS WITH HEALTH INSURANCE PROVIDER  
TO ENLIST BUSINESS LEADERS IN CANCER PREVENTION

By George Beschen

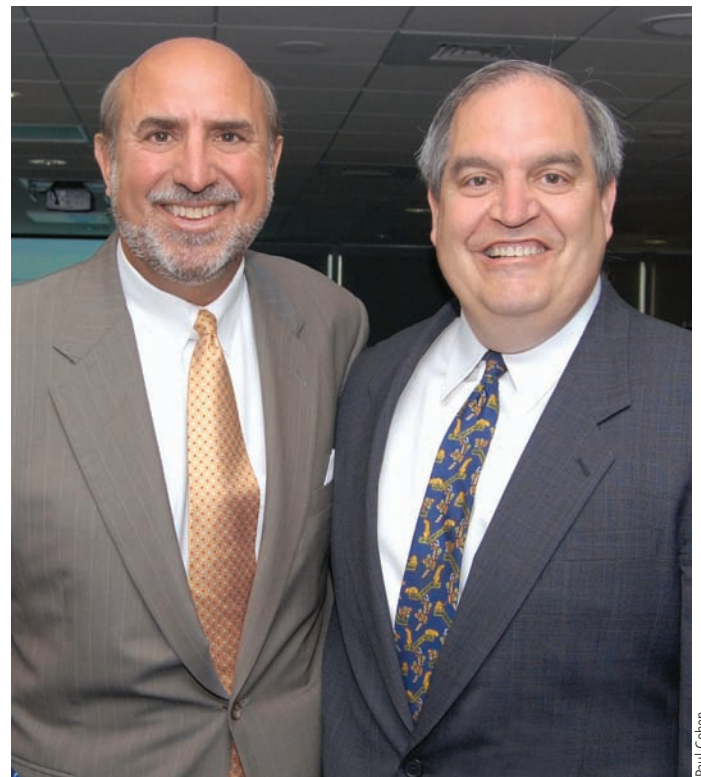
**T**he 30 or so business executives in the room represented tens of thousands of employees at organizations as notable as Sunoco Inc., Citizens Bank, and the Philadelphia Phillies. On this occasion, however, they were focused not on market trends and profit margins but on another critical bottom line: their health and that of their employees.

Fox Chase teamed up with Independence Blue Cross—the Philadelphia region’s largest health insurer, with 9,500 employees and 3.4 million customers—to host area business leaders at IBC’s Philadelphia headquarters in June. Together, the duo made a pitch to the executives to become advocates for cancer screening and prevention education for their employees—efforts that can benefit both individuals and businesses.

In addition to the devastating toll cancer takes on human lives, the National Institutes of Health estimates that the disease costs the United States more than \$200 billion each year in medical expenses, loss of productivity, and premature death. Prevention and early detection through screening represent the best and most cost-effective means of reducing these expenses—and saving lives.

“We jumped at the chance to do this with Fox Chase,” says Joseph A. Frick, IBC president and chief executive officer. “The more we can bring all the stakeholders together for informed discussion and dialogue, the better.”

Fox Chase president and chief executive officer Michael V. Seiden took the opportunity to describe Fox Chase’s innovative prevention programs. The pioneering Margaret Dyson Family Risk Assessment Program provides personalized prevention strategies and early detection services for women at



Paul Cohen

Independence Blue Cross president Joseph A. Frick, left, joins Fox Chase president Michael V. Seiden at an event designed to educate business leaders about advocating for cancer prevention.

heightened risk of breast or ovarian cancer, and Fox Chase has established similar programs for gastrointestinal cancers, prostate cancer, and melanoma. *(To read more about Fox Chase’s risk assessment programs, see page 20.)*

The Center is now expanding its risk assessment efforts through the Keystone Program in Personalized Risk and Prevention. *(To read more about the Keystone Programs, see page 4.)*

Forecasting where such research will lead, Seiden predicted the advent of a “genetic report card” within the next five to 10 years that will identify which types of cancer an individual is most at risk of developing. He noted that exploring the ramifications of that capability—for both patients and insurers—is one of the goals of the Keystone Program.

### The Cost of Cancer

Neal J. Meropol, director of Fox Chase’s Gastrointestinal Cancer Program and Gastrointestinal Tumor Risk Assessment Program, used colon cancer as an example to explain to the audience the bottom line on costs related to preventive measures such as screening tests (\$10,000 to \$25,000 per year of life saved) compared to the treatment of advanced cancer (\$200,000 per year of life saved). Some of that cost is covered by insurance companies, but patients and their families shoulder major financial burdens as well.

Meropol, who spent a sabbatical at the University of Pennsylvania’s Leonard Davis Institute of Health Economics last year, later elaborated: “One in four families dips deeply into their life savings to pursue cancer treatment. Add in the cost of missing work, the cost of traveling to appointments—there are so many ways a serious illness can be costly.”

Getting people to use available preventive measures can be a challenge, however, as Meropol told his audience. For example, while 85 percent of women take advantage of screening tests for cervical cancer and 70 percent for breast cancer, the screening rate drops to 50 percent of patients for both colorectal and prostate cancers.

That’s where employers come in. IBC senior vice president and chief medical officer I. Steven Udvarhelyi presented an overview of the prevention and wellness initiatives offered by IBC to illustrate the kinds of programs in which CEOs can encourage their employees to participate. IBC offers educational resources including seminars, a library, and a

Web site; healthy-lifestyle support such as health coaching and smoking-cessation assistance; and screening outreach and reminders.

“People walked away saying, ‘Wow, I have a lot to learn and there’s a lot I could be doing,’” Frick says.

Frick also shared his own Fox Chase story with the audience. Noting his standing as “one of the 10 million Americans living with cancer,” he described how he was diagnosed with colon cancer following a routine colonoscopy in April 2007. After surgery revealed the need for additional treatment, Frick headed to Fox Chase for a six-month course of chemotherapy.

“I felt like I was in good hands, and I also felt that everyone with whom I interacted understood how important their work was and how vulnerable their patients feel,” he said. “I am touched forever by the skill and compassion I found at Fox Chase.”

Today, Frick reflects on what his diagnosis has meant to him: “It’s changed the way I think, act, lead, and love.” And as a business leader, he says, “I think it’s given me more of a sense of urgency. I have an added responsibility to try to be progressive in tackling the challenges that we face.” ■

“PEOPLE WALKED AWAY SAYING, ‘WOW, I HAVE A LOT TO LEARN AND THERE’S A LOT I COULD BE DOING.’”

### FOX CHASE RESOURCES

**TO HELP** businesses encourage cancer screening and prevention education for their employees, Fox Chase provides:

- \* **A mobile mammography unit** that provides screenings at workplaces and in the community.
- \* **Lunch seminars** led by Fox Chase health educators
- \* **Live online help** at [www.fccc.edu/cancer/liveHelp.html](http://www.fccc.edu/cancer/liveHelp.html)
- \* **A list of reputable, up-to-date Web sources** for cancer information at [www.fccc.edu/patients/rec/index.html](http://www.fccc.edu/patients/rec/index.html)

For more information, call 1-888-FOX CHASE (1-888-369-2427) or visit [www.fccc.edu](http://www.fccc.edu).

# RISK ASSESSMENT AT FOX CHASE

A PERSONAL APPROACH TO PREVENTION By Jill Horne



Paul Cohen

Fox Chase physician Mary B. Daly, left, and patient Jane Tervooren

**F**or people enrolled in Fox Chase's risk assessment programs, cancer prevention is personal. Many have a family history of the disease. They have watched loved ones deal with the shock of diagnosis and struggle with the challenges of treatment. They have concerns about their own health and how genetics and other risk factors might shape their futures.

Jane Tervooren, whose mother and grandmother died of ovarian cancer, was among the first to take part in the Margaret Dyson Family Risk Assessment Program at Fox Chase when it began in 1991. Because of her cancer risk, she had her ovaries removed as a preventive measure. Her breast cancer, which developed 16 years later, was caught by the watchful eyes of Dyson program staff.

"I tried everything in my power to prevent cancer," Tervooren says, "but at the end of the day, I had the peace of mind of knowing my cancer was caught at the earliest and most treatable stage."

Founded by medical oncologist Mary B. Daly, vice president and deputy scientific director, the Dyson program provides personalized prevention strategies and early detection services for women with a family history of breast or ovarian cancer. The first program of its kind in the region

and one of the first in the nation, it has served more than 10,000 families.

"Prevention is one of the most effective ways to decrease the burden of cancer," says program director Angela R. Bradbury. "Our innovative family risk assessment program is one example of Fox Chase's comprehensive approach to cancer care, which includes a commitment to research on how people cope with genetic risks. As genetic testing becomes more prevalent, this research is gaining even more importance."

The Dyson program has served as a model for similar initiatives across the country, as well as additional programs at Fox Chase. The Center now also conducts risk assessment for gastrointestinal cancers, prostate cancer, and melanoma

**"I have always felt that knowledge is power."**

and is expanding its programs to include lung and head and neck cancers. Services include education, a personal risk review, screening and screening recommendations, and counseling about genetic testing, if appropriate. In addition, scientists and clinicians conduct ongoing research into the causes of cancer, including genetic and environmental factors. Their work aims to advance the understanding of how to prevent and treat specific cancers.

Since completing treatment at Fox Chase, Tervooren has returned to her active lifestyle. When she's not working as a marketing director, she enjoys weightlifting, running with her dog, bicycling, and spending time with her three sons.

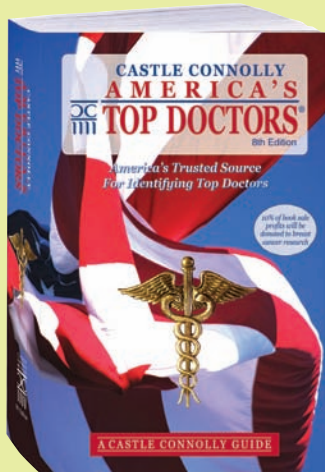
She is convinced that if more people knew about initiatives like the Dyson program, more cancers would be caught early and more lives would be saved.

"Many women at risk avoid programs like this because they are so afraid of breast cancer," Tervooren points out. "I have always felt that knowledge is power." ■■

## LEARN MORE

For more information about Fox Chase's risk assessment programs or to find out if you might be eligible, visit [www.fccc.edu](http://www.fccc.edu) and click on "Prevention, Risk and Screening" or call 1-888-FOX CHASE (1-888-369-2427).

**FOX CHASE STAFF MEMBERS** often are called upon by the media to share their expertise in cancer care and research. Following are highlights of recent Fox Chase media coverage.



## Physicians Listed as 'America's Top Doctors'

**T**wenty-nine Fox Chase physicians are included in the latest edition of *America's Top Doctors*, issued in January. Featured doctors are peer-nominated and screened by physician-led research teams based on criteria such as qualifications, including education; professional reputation; hospital appointment; and experience.

The guide represents the top 1 percent of doctors in the nation, according to publisher Castle Connolly, a health-care research and information company that works to help patients identify the nation's top doctors and hospitals. The listing led to 27 of the Fox Chase physicians also being featured in *Philadelphia* magazine's annual "Top Doctors" issue, published in April.

To see the lists of Fox Chase physicians featured by Castle Connolly and Philadelphia magazine, visit [www.fccc.edu/news](http://www.fccc.edu/news) and see the press releases under "Latest News."

## Oncologist Discusses Cost of Cancer Care on NPR

**N**eal J. Meropol, director of the Gastrointestinal Cancer Program and the Gastrointestinal Tumor Risk Assessment Program, was a guest in July on National Public Radio's *The Diane Rehm Show*, which reaches more than 1.7 million listeners worldwide. The hour-long program addressed the high cost of cancer care and its impact on both patients and doctors.

"Increasingly, because of the high cost of the treatments we provide, patients are facing large out-of-pocket expenses," said Meropol, who is part of a national task force studying the cost of cancer care. "These expenses are creating burdens on patients and their families."

To listen to the NPR broadcast, visit [www.fccc.edu/physicians/directory.html](http://www.fccc.edu/physicians/directory.html) and click on "Neal J. Meropol, M.D."

## 'Business Week' Features Study on Exercise, Colon Cancer

**B**ehavioral researcher Elliott Coups authored a revealing study on the link between exercise and colon cancer that was reported in national outlets including *Business Week*, *U.S. News & World Report*, and *Women's World*. The study appeared in August in *Patient Education and Counseling*.

Coups found that a sedentary lifestyle accounts for as much as 14 percent of all colon cancer cases in the United States and that people who exercise have a 30 to 40 percent lower risk of developing the disease. Even walking one hour a week was shown to improve one's odds.

"Patients may not be learning this information from their health-care providers, and information regarding colon cancer prevention is not as well publicized as it could be," said Coups, whose research focuses on understanding and promoting health-related behaviors among cancer survivors.

## Physician Discusses Colonoscopies in 'U.S. News & World Report'

**G**astroenterologist David S. Weinberg, chairman of the department of medicine, was featured in December in an online *U.S. News & World Report* story about the effectiveness of colonoscopies. The article followed a study in the journal *Annals of Internal Medicine* showing that instead of detecting 90 percent of cancers, as previously thought, colonoscopies might actually detect 60 to 70 percent.

The lesson provided by the new research is that "you should have a colonoscopy done by a person who does a lot of them and does them well," Weinberg said. "The doctor's expertise is one part of the colonoscopy quality equation."



### ON THE WEB

To read more about how Fox Chase is making news, visit [www.fccc.edu/news](http://www.fccc.edu/news).

A CONVERSATION WITH BARUCH S. BLUMBERG

# 'Fishing Expedition' Led to Nobel Prize

By Greg Lester

Fox Chase's Baruch S. Blumberg was awarded the Nobel Prize in medicine in 1976 for his work in discovering the hepatitis B virus, the leading cause of liver cancer. He subsequently invented a vaccine against the disease—effectively, the first cancer vaccine—that has become one of the most widely used in the world, with billions of doses administered. Here, Blumberg describes the path that led to his groundbreaking discovery.

**Q** You were trained as a physician. How did you make the jump to research?

**A** Even before entering medical school, I had a strong inclination, based in large part on my father's suggestion, that I would enter research. In 1955, after four years of medical training at Bellevue Hospital and the Presbyterian Hospital of Columbia University, I decided to get into laboratory work. I went to Balliol College at the University of Oxford to earn a doctorate in biochemistry. That was where I became interested in inherited biochemical variation.



Paul Cohen



My colleagues and I began taking field trips and doing studies on human blood specimens. This was before we had the tools to study genes—well before the Human Genome Project—so we studied blood serum proteins, looking for small differences and determining which were genetically influenced. We were getting an idea of the distribution of these traits among different populations and how the environment of each might have had an effect. Over the years, we crossed the globe. One year we'd visit a remote Arctic village, the next Africa or an island in the Pacific.

**Q** *Why were you interested in these genetic variations?*

**A** I was always interested in why some people get sick and others don't. It is a basic question in medicine—perhaps *the* basic question. As a physician, you see someone lying in bed and think, "Why is he or she there and I'm not, even though we've had the same kind of exposure?"

The plan was to look at each inherited difference in a protein, then figure out which disease it was related to. Sometimes such things are pejoratively called "fishing expeditions," but that's exactly what we wanted to do. We were trained medically and in laboratory research; in the field, we became more familiar with the background disease patterns.

**Q** *You came to Fox Chase in 1964. What drew you here?*

**A** The approach here was to do basic science—to understand cells and genetics at a basic scientific level. I thought that was the way to go forward in understanding the basis of disease, and I still do. Our study of genetic variation was a basic science question, with the expectation that applications would come in time.

**Q** *Did you set out to find hepatitis B?*

**A** We did not, but you can't say that it was accidental, either. We didn't know what we would find, but we knew we'd find something. Very often, when people tell the story, they recast it as if finding hepatitis B was the original intention. That wasn't our story.

**Q** *How did the hepatitis discovery come about?*

**A** We began to look for proteins that differed from each other in an antigenic sense, or how they elicited an immune response. The notion was that, if someone received many blood transfusions, they would be exposed to variants of proteins they hadn't inherited. If those transfused proteins were antigenic, you'd find an antibody in the patient. We would then use that antibody to look for the antigen in the blood of people we'd sampled. Nobody had thought of using that technique, as far as we knew.

We found, in a hemophilia patient, an antibody against what we would later learn was the surface antigen of hepatitis B virus. We found the antigen in a number of samples we collected, including that of an Australian, so we called it the Australia antigen and, for half a year or so, we didn't know what it was.

**Q** *Did you have any idea that it was hepatitis B?*

**A** Even early on, we had some idea it was hepatitis. We knew that people who had transfusions got hepatitis, so we had an inkling.

Within a short time, a few episodes increased our suspicions. For example, we were studying Down syndrome patients, who had a prevalence of hepatitis B, and found that

many also had the Australia antigen. That led to our first publication identifying hepatitis B in 1967. In 1969, Fox Chase filed the patent for the vaccine, with Irving Millman and me as co-inventors; it was granted a few years later. The vaccine was made by extracting the antigen from the blood of carriers and treating it to kill any live viruses. Nobody has made a vaccine like that before or since.

*"We didn't know what we'd find, but we knew we'd find something."*

**Q** *Did you know you were making a cancer vaccine?*

**A** We suspected, but there wasn't sufficient supporting data. There had been studies in West Africa, primarily, linking liver cancer to underlying liver disease—cirrhosis—that was thought to be caused by hepatitis. We also published studies in the '60s linking liver cancer and the Australia antigen, but they were not conclusive.

**Q** *Have you thought about how many lives your research has saved?*

**A** People have made calculations, and the numbers are in the millions. Of course, the impact is hard to appreciate. One of the problems with preventative medicine is that, if it works, nothing happens. ■

{review}

The distinction recognizes Fox Chase for providing high-quality patient assessment and treatment planning, inpatient care, and major surgical treatment for complex and rare cancers.

## Fox Chase Designated Center for Complex and Rare Cancers

Fox Chase has been named a Blue Distinction Center for Complex and Rare Cancers



by the Blue Cross and Blue Shield companies. The distinction recognizes the Center for providing high-quality patient assessment and treatment planning, inpatient care, and major surgical treatment, all delivered by teams with expertise and subspecialty training in

complex and rare cancers. Fox Chase earned the designation for soft tissue sarcoma and esophageal,

pancreatic, gastric, rectal, bladder, thyroid, and head and neck cancers.

Blue Distinction is a nationwide program created to help patients identify institutions that offer the best practices and highest standards in various medical specialties.

## Fox Chase Joins with Lincoln University to Promote Cancer Research

Fox Chase has partnered with Lincoln University, a historically black university in southeastern Pennsylvania, to foster cancer research and mentor and train young, minority scientists.

Through the partnership, Lincoln students and their faculty mentors will work closely with researchers at Fox Chase and students will take part in a summer internship program at the Center. The experience is designed to

develop students' skills as researchers and create a pipeline of Lincoln graduates who choose to further their education in cancer biology, population science, and medicine.

In addition, the partnership will promote research collaborations among faculty at both institutions in areas such as health disparities, basic science, and clinical science.

The project was awarded a four-year grant by the National Cancer Institute.

## Internationally Recognized Researcher Named Chief Scientific Officer

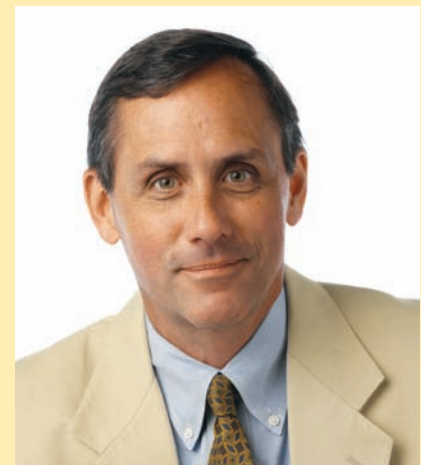
Jeff Boyd has been named chief scientific officer at Fox Chase. His role is to coordinate and chart the future course of Fox Chase research.

Boyd is an internationally recognized expert in translational research—research that helps turn scientific discoveries into improved clinical care. He has helped define the role of oncogenes, or cancer-causing genes, as well as the tumor-suppressor genes that normally protect against cancer. Changes in some tumor-suppressor genes, such as p53, BRCA1, and BRCA2, can contribute to breast and ovarian cancers.

"Jeff possesses impeccable integrity in bringing about exceptional accomplishments

in science," president and chief executive officer Michael V. Seiden said in announcing Boyd's appointment. "During his 30 years in science, he has spent an extraordinary amount of time not only immersed in cancer biology and genetics, but also working closely with surgeons, medical oncologists, and radiation oncologists."

Boyd holds the Robert C. Young, M.D., Chair in Cancer Research. Before joining Fox Chase, he was vice president of oncology and research at Memorial University Medical Center in Savannah, Georgia, and director of the center's Curtis and Elizabeth Anderson Cancer Institute.



# Young People Honor Loved Ones by Supporting Fox Chase

FOR SOME REMARKABLE YOUNGSTERS, charity not only begins at home but also starts at an early age. In October, Fox Chase honored four industrious young philanthropists who have supported research at the Center.

## Zach Attacks Cancer

Zachary Herr, 14, wanted to thank Fox Chase for successfully treating his mother, Cyndie, for rectal cancer. (To read *Cyndie Herr's story*, visit [www.fccc.edu/whyChoose/herr.html](http://www.fccc.edu/whyChoose/herr.html).) Already a regular on the International Junior Golf Tour, Zach decided to start his own tournament at Jericho National Golf Club in New Hope, Pennsylvania, to raise funds for cancer research at Fox Chase.

The first Zach Attacks Cancer Golf Tournament, held last summer, netted \$60,000 for Fox Chase, topping Zach's goal by 20 percent. The next annual tournament, slated for June 9, will include both live and silent auctions.

For more information on *Zach Attacks Cancer*, visit [ZachAttacksCancer.com](http://ZachAttacksCancer.com).

## Team Tommy Z

Zeke Zacierka, 8, was a baby when his father, "Tommy Z," died of cancer in 2001. To keep his memory alive, Zeke and his mother, Lorraine, organized an annual "Day in the Park" at Laurel Acres Park in Mt. Laurel, New Jersey. Friends and family participate as "Team Tommy Z," along with others who have lost loved ones to cancer. The event includes a walk-a-thon, fishing, volleyball, and other activities.

The event raised more than \$15,000 for Fox Chase in 2008. Since it began in 2002, it has raised nearly \$90,000 for the Center.

For more information on *Team Tommy Z's Day in the Park*, visit [www.TeamTommyZ.com](http://www.TeamTommyZ.com).

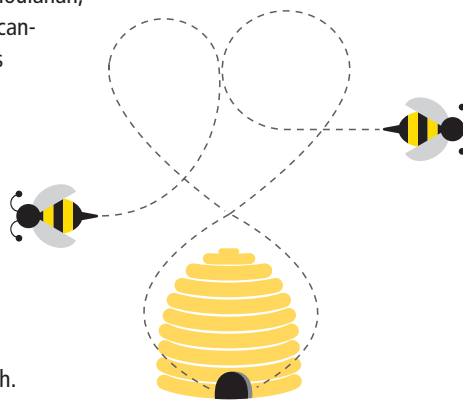
## Hives for Lives

Molly and Carolyn "Carly" Houlahan of Devon, Pennsylvania, wanted to take action to honor their grandfather, Mike Houlahan, after he died suddenly of throat cancer. Their maternal grandparents keep bees, so Molly, 16, and Carly, 14, launched Hives for Lives in 2004.

Their business of harvesting and selling honey, beeswax candles, and lip balm reaped \$11,000 for Fox Chase in 2008. Since it began in 2004, Hives for Lives has earned \$45,000 for cancer research.

The nonprofit organization now has more than 20 hives. The sisters and their "helper bees" harvest the honey and then spin, filter, bottle, and label it by hand. They sell their products through stores, markets, fairs, and the Internet.

For more information on *Hives for Lives*, visit [www.hivesforlives.com](http://www.hivesforlives.com).



The young people's fundraising initiatives have raised more than \$160,000 for Fox Chase.

## WANT TO GET INVOLVED?

If you are interested in holding a fundraising event to support Fox Chase, please contact Kitty Crosley at [Kitty.Crosley@fccc.edu](mailto:Kitty.Crosley@fccc.edu) or 215-728-7409.

## Jordan Named Honorary Fellow of the Royal Society of Medicine

**F**ox Chase pharmacologist V. Craig Jordan, a native of England, was one of only five scholars from around the world to receive an Honorary Fellowship of the Royal Society of Medicine in July at the RSM headquarters in London. The award is one of the highest honors in British medicine.

The fellowship recognizes Jordan's exceptional scientific contributions, which resulted in the clinical use of the drugs tamoxifen and raloxifene. Tamoxifen, the first prevention drug for any cancer, was the "gold standard" for breast cancer treatment for more than 20 years. Raloxifene, shown by Jordan to preserve bone density and prevent mammary cancer in laboratory animals, is used today to



prevent osteoporosis in postmenopausal women. Both drugs are also FDA-approved to reduce breast cancer risk in certain women.

## Supporting Cancer Research in Their Own Backyard

**T**he spirit of competition came alive when the Falcon Foundation held its fifth annual Two-Man Competition and fundraiser in Yardley, Pennsylvania, in July. The event raised almost \$55,000 for Fox Chase.

The competition involves two-man teams going head-to-head in backyard-style challenges including badminton, basketball, darts, horseshoes, and wiffleball. The team with the highest total score is crowned champion of the day.

"We're in a race against time," said Blaine Applegate, a Falcon Foundation founder who lost his mother to colon cancer. "We're not the frontline fighters, we're not the scientists, but we think that without that funding, the research doesn't continue as quickly as it needs to."

The foundation's sixth annual competition will take place July 18.

*Information on the Falcon Foundation is available at [www.theFalconFoundation.org](http://www.theFalconFoundation.org).*

## Ridge Elected to Lead American Head & Neck Society

**J**ohn A. "Drew" Ridge, chief of head and neck surgery, has been elected president of the American Head & Neck Society, the largest organization in North America dedicated to the advancement of

research and education in head and neck oncology.

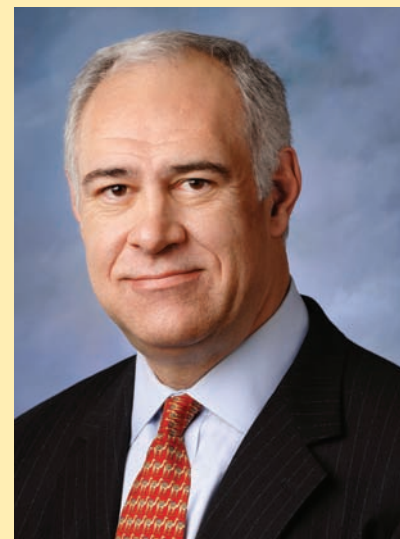
Ridge treats patients with cancers of the head and neck, as well as endocrine cancers. He will serve for the 2009–10 term.

## Endowed Chair in Molecular Imaging Established

**B**oard member Donald E. Morel Jr., Ph.D., and his wife Lauren Morel have made a \$2 million gift to Fox Chase to create the Donald E. & Shirley Morel, Stanley & Stella Bayster Endowed Chair in Molecular Imaging.

"Last year marked the 20th anniversary of my father's death from cancer at 53," says Morel, who is chairman, president, and chief executive officer of West Pharmaceutical Services Inc. in Lionville, Pennsylvania. "In naming this chair after our parents, Lauren and I hope that the research supported by our gift, and the work of Fox Chase overall, will ensure that children everywhere will have their grandparents around to spoil them."

The endowed chair—the sixteenth at Fox Chase since 1993—will be filled by a senior radiologist to be identified this year.



Donald E. Morel Jr.

# Fox Chase Web Site Receives Award

Fox Chase's Web site, [www.fccc.edu](http://www.fccc.edu), won a 2008 eHealthcare Leadership Award for best site design from Strategic Health Care Communications. The site was selected from among more than 1,100 entries in the "Hospitals Under 200 Beds" category by a panel of health-care Web strategy experts.

Redesigned in April 2008 to be more "user friendly," the Web site offers patient testimonials, podcasts, video chats by Fox Chase doctors, and a patient portal. As it continues to grow, the site will add more interactive features and expanded updates on Fox Chase research and news.

Visitors can check out the following features on the award-winning site:

- ▶ **MEET OUR DOCTORS**  
Visit [www.fccc.edu/physicians](http://www.fccc.edu/physicians) and click on "Physicians Directory."
- ▶ **BE INSPIRED BY OUR PATIENTS**  
Visit [www.fccc.edu/WhyChoose](http://www.fccc.edu/WhyChoose) and click on "Success Stories."
- ▶ **MEET OUR SUPPORTERS**  
Go to [www.fccc.edu/HelpingFoxChase](http://www.fccc.edu/HelpingFoxChase) and click on "Donor Stories."



Redesigned in April 2008 to be more "user friendly," Fox Chase's Web site offers patient testimonials, podcasts, video chats by doctors, and a patient portal.

## Free Online Service Helps People Say They Care

To help people stay in touch with loved ones while undergoing cancer treatment, Fox Chase offers a free online service called CarePages at [www.carepages.com/fccc](http://www.carepages.com/fccc). These personalized Web pages make it easier for patients to keep others up to date on their progress, both during and following treatment.



Through CarePages, patients can update all of their loved ones at once without repeat phone calls or e-mails. They can also share pictures on the site, and message boards let friends and family post messages of support.

CarePages are secure and password-protected and meet all patient privacy regulations.

## Convenience Stores Raise Money for Mobile Mammograms

**B**y dropping their extra coins in collection boxes at the checkout register, patrons of Wawa convenience stores are helping Philadelphia-area women get needed breast cancer screenings.

Wawa customers and employees throughout Pennsylvania donated \$169,000 to Fox

Chase last summer to support the Center's mobile mammography van, which provides 4,600 screenings a year at workplaces and in the community.

"About four out of 10 women do not get regular screening mammograms," says Linda Hammell, director of Fox Chase's cancer screening program. "For women with limited or no health insurance, those rates are even lower. With the generous support of partners such as Wawa, Fox Chase can continue to provide these potentially lifesaving screenings to those most in need."

The program has collected more than \$391,000 since it began in 2006.



Fox Chase's mobile mammography van provides 4,600 screenings a year at workplaces and in the community.



### ON THE WEB

For more information on Fox Chase's mobile mammography van, visit [www.fccc.edu/prevention/outreach](http://www.fccc.edu/prevention/outreach) and click on "The Mammography Van" at right.

## Grocery Store Teams with Fox Chase to Fight Breast Cancer

**G**enuardi's Markets presented almost \$108,000 to Fox Chase for breast cancer research in October. Employees and customers at the store's 36 Philadelphia-area locations raised the funds through donations, contests, special product sales, and other events. Their efforts were part of a national campaign by Genuardi's parent company, Safeway Inc., which ran in October



for Breast Cancer Awareness Month.

The funds will support the work of pharmacologist V. Craig Jordan, whose research has identified the role of engineered hormones in the prevention and treatment of breast cancer. Jordan's laboratory is working to bring new treatments from the lab to clinical trials and make new breast cancer drugs available sooner.

### A FOX CHASE FIRST

**In 2000**, Fox Chase became the first cancer center in the nation and the first hospital in Pennsylvania to earn the Magnet Award for Nursing Excellence—the highest honor awarded by the American Nurses Credentialing Center. Magnet hospitals are shown to have better patient outcomes than non-Magnet hospitals.

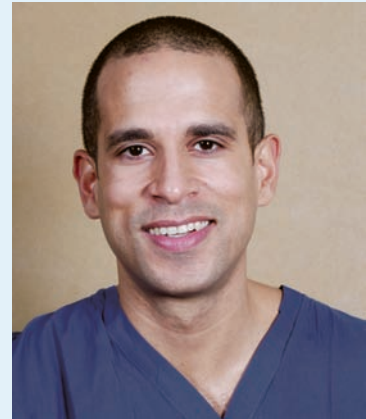
FOX CHASE RECENTLY WELCOMED THE FOLLOWING CLINICIANS AND RESEARCHERS TO ITS STAFF.

## Surgeon, Thoracic Oncologist Join Clinical Faculty

**ANDREW A. GUMBS** is director of minimally invasive hepato-pancreato-biliary, or HPB, surgery—surgery of the liver, pancreas, bile ducts, and gallbladder. He is also associate director of Fox Chase's minimally invasive surgery and endoscopic skills fusion laboratory, where doctors train residents and fellows in techniques such as laparoscopy and endoscopy. The lab will also be a center for developing new instruments and robotic devices.

Gumbs is the first American surgeon to complete a fellowship in minimally invasive HPB surgery at the Institut Mutualiste Montsouris, Université René Descartes, in Paris, where the first published case of laparoscopic gallbladder removal took place. He is one of only a handful of U.S. surgeons to conduct major liver surgery and complicated surgeries of the pancreas, called Whipple procedures, that are completely laparoscopic, meaning that they are performed through very small incisions.

Gumbs has worked with Doctors Without Borders in the Democratic Republic of the Congo. He received his M.D. from Yale School of Medicine and came to Fox Chase from New York-Presbyterian Hospital and Columbia University College of Physicians and Surgeons.



**GEORGE R. SIMON** is director of thoracic oncology. He treats patients with cancers of the chest, especially lung cancer and mesothelioma. "My special interests lie in developing individualized treatment strategies for patients based on their molecular profile," Simon notes.

Simon takes a personalized approach to treating patients with advanced non-small-cell lung cancer, tailoring treatment based on the activity of genes in the patients' tumors. He is also exploring new drug combinations for patients with mesothelioma, an asbestos-related cancer of the chest lining.

Simon earned his M.D. at Christian Medical College & Hospital, Ludhiana, Punjab, India. He came to Fox Chase from the University of Florida's H. Lee Moffitt Cancer Center and Research Institute.



## CLINICIANS

**Igor Astsaturov**, a medical oncologist, specializes in gastrointestinal cancers including pancreatic, colorectal, and neuroendocrine cancers. He recently completed a fellowship in medical oncology at Fox Chase. In addition to treating patients, Astsaturov studies cancer biology with the goal of designing more personalized treatments for patients with gastrointestinal cancers. He earned his medical degree at the I.M. Sechenov Medical Academy in Moscow and his Ph.D. at the Russian Hematological Research Center.

**Stephen A. Boorjian**, a urologic surgeon, treats patients with prostate, bladder, kidney, testicular, ureteral, penile, and urethral cancers. He has extensive training in minimally invasive surgery, including nerve-sparing surgery for men with prostate cancer. He also has specialty training in treating advanced cancers, including kidney and bladder cancer. Boorjian earned his M.D. at Harvard Medical School and came to Fox Chase after completing a fellowship in urologic oncology at the Mayo Clinic.

**Robert A. Burger** is a gynecologic oncologist in the department of surgery. He treats women with ovarian, uterine, and cervical cancers and related conditions and is co-director of the ovarian cancer research program. He earned his M.D. at New York University School of Medicine and came to Fox Chase from the University of California's Irvine Medical Center, where he served as associate professor.

*continued on next page*

**CLINICIANS** *(continued)*

**Emmie I. Chen** is a psychiatrist who provides consultations for Fox Chase patients needing psychiatric care and support. Chen came to Fox Chase from Children's Hospital of Philadelphia and the University of Pennsylvania, where she completed her residency training. She earned her M.D. at Thomas Jefferson Medical College.

**Adam D. Cohen**, a medical oncologist, treats patients with cancers of the blood and bone marrow, such as leukemia and lymphoma. He has a special interest in multiple myeloma and a rare related disorder called amyloidosis. Cohen earned his M.D. at the University of Pennsylvania School of Medicine. He came to Fox Chase from Memorial Sloan-Kettering Cancer Center, where he completed a fellowship in hematology and oncology.

**Holly Dushkin** is a medical oncologist who treats patients with breast and gastrointestinal cancers, including colorectal cancer. Dushkin received her M.D. from Temple University. She completed a fellowship in hematology and medical oncology at Fox Chase and recently returned to the Center after working at Annapolis Oncology Center and Anne Arundel Medical Center.

**Scot W. Ebbinghaus**, a medical oncologist, treats patients with lung cancer. Ebbinghaus earned his M.D. at the University of Missouri at Kansas City and held a fellowship in hematology and oncology at the University of Alabama at Birmingham. He came to Fox Chase from the University of Arizona and Arizona Cancer Center, where he served as associate professor of medicine and medical oncologist.

**Michael John Hall**, a medical oncologist, treats patients with gastrointestinal cancers, focusing on tumors of the pancreas, small bowel, and colon. Hall also takes part in gastrointestinal cancer risk assessment, including risk counseling and genetic testing. He earned his M.D. at Columbia University. Before joining Fox Chase, he served on the faculty at Columbia.

**Stephen J. Heller**, a gastroenterologist and therapeutic endoscopist, treats patients with precancerous conditions and early-stage cancers, including premalignant disease of the esophagus and early-stage stomach tumors. Heller received his M.D. from Columbia University. Before joining Fox Chase, he practiced at the Lahey Clinic in Boston.

**James L. Helstrom** is an anesthesiologist in the department of surgery. He received his M.D. from the University of Colorado School of Medicine. Helstrom came to Fox Chase from Massachusetts General Hospital and Harvard Medical School, where he was an anesthesiologist and instructor of anesthesiology, respectively. He has won a number of awards, including the Henry K. Beecher Award for Resident Teaching in 2007 and 2008.

**Mala T. Kailasam**, an internist, has joined Fox Chase's hospitalist service. She helps to coordinate care and address medical issues for hospitalized patients. She earned her M.D. at Bangalore Medical College in Bangalore, India. Before joining Fox Chase, Kailasam practiced at MidState Medical Center in Meriden, Connecticut.

**Nicolas K. Kuritzky**, a radiation oncologist, specializes in treating patients with genitourinary and gastrointestinal cancers. He came to Fox Chase from Temple Univer-

sity Hospital. Kuritzky earned his M.D. at the University of Pennsylvania School of Medicine, where he won the James D. Saunders Prize for excellence in research.

**Abraham "Avi" Lebenthal**, a thoracic surgeon, focuses on minimally invasive approaches to chest tumors, including cancers of the lung and esophagus. Lebenthal is experienced in video-assisted thoracic surgery, advanced laparoscopy, and endoscopy techniques, including laser therapy and photodynamic therapy. He earned his M.D. at Hebrew University Medical School in Jerusalem. His experience as a physician includes 13 years of service in the Israeli army. He came to Fox Chase from Harvard Medical School's Brigham and Women's Hospital, where he completed four years of clinical fellowships.

**Karen Y. Mechanic** is Fox Chase's first director of psychiatry, a role in which she provides psychiatric consultations to patients. Mechanic earned her M.D. at the State University of New York Health Science Center. Previously, she was an assistant professor of psychiatry at Yale and at the University of Pennsylvania and was in private practice in Marlton, New Jersey. Most recently, she served as chairwoman of the department of psychiatry at Underwood-Memorial Hospital in Woodbury, New Jersey.

**PROMOTIONS**



**ROBERT G. UZZO** has become chairman of the department of surgery. He also has been named to the G. Willing "Wing" Pepper Chair in Cancer Research. Uzzo is a national leader in treating urologic cancers, particularly kidney cancer. One of the Philadelphia region's first minimally invasive oncologists in his specialty, Uzzo focuses on laparoscopic and robotic organ-sparing, reconstructive, and nerve-sparing techniques, which are key to preserving patients' normal functions.

Uzzo earned his M.D. at Cornell University Medical College and underwent fellowship training in urologic oncology, renal transplant, and renal vascular surgery at the Cleveland Clinic before joining the Fox Chase faculty in 2000.



## PROMOTIONS

**Tara Morrison**, a neuro-oncologist, treats patients with brain tumors, as well as those who have neurologic problems as a result of their cancer or treatment. Morrison received her M.D. from the University of Ottawa. She is a fellow of Canada's Royal College of Physicians. Before coming to Fox Chase, she was an assistant professor of neurology at Drexel University College of Medicine and director of the Brain and Spinal Tumor Center at Hahnemann University Hospital. She also served on the staff of Cancer Treatment Centers of America's Eastern Regional Medical Center in Philadelphia.

**Elizabeth "Betsy" R. Plimack**, a medical oncologist, specializes in treating patients with genitourinary cancers, such as bladder, kidney, prostate, and testicular cancers. Plimack earned her M.D. at New York University. She came to Fox Chase from the University of Texas M.D. Anderson Cancer Center, where she completed her fellowship in medical oncology, serving as chief fellow.

**Valentin G. Robu**, a pathologist, directs Fox Chase's outpatient laboratory. His expertise is in hematopathology—the study of diseases of the blood—and surgical pathology. He works closely with doctors of various specialties to determine patients' diagnoses. Robu earned his M.D. at the University of Medicine and Pharmacy in Bucharest, Romania, and his Ph.D. from the University of Wisconsin. Before coming to Fox Chase, he completed fellowships in hematopathology and surgical pathology at the University of Minnesota.

**Mark L. Sobczak**, a radiation oncologist, specializes in intensity-modulated radiation therapy, image-guided radiation therapy, brachytherapy, and three-dimensional treatment planning. Before joining Fox Chase, he served as a regional medical director in Maryland and Delaware for 21st Century Oncology. A distinguished graduate of the United States Naval Academy, Sobczak received his M.D. from the Uniformed Services University of the Health Sciences.

**MARY B. DALY** and **JONATHAN CHERNOFF** recently accepted the dual positions of vice president and deputy scientific director. They work closely with senior vice president and chief scientific officer Jeff Boyd to direct Fox Chase's scientific research. They also will retain their own research programs.

Daly, a medical oncologist, focuses on the hereditary patterns of cancer and is founder of one of the first cancer risk assessment programs in the country—the Margaret Dyson Family Risk Assessment Program at Fox Chase. She directs the Cancer Prevention and Control Program and was recently appointed chairwoman of the new Department of Clinical Genetics. She also holds the Timothy R. Talbot Jr. Endowed Chair in Cancer Research. Daly earned her M.D. and Ph.D. at the University of North Carolina at Chapel Hill School of Medicine.

Chernoff, a molecular oncologist, focuses on the factors that control cell growth and movement, including oncogenes and tumor-suppressor genes. In recognition of his scientific leadership, he has also been appointed to the Stanley P. Reimann Chair in Oncology Research. Chernoff received his M.D. and Ph.D. at Mount Sinai School of Medicine.



## RESEARCHERS

**Jennifer Rhodes**, a hematobiologist, uses the zebrafish model system to study genes that regulate the specialized cells of the blood system and to understand how these cells turn into cancer. Rhodes earned her Ph.D. at Oregon Health Sciences University. Before joining Fox Chase, she was an instructor of pediatric oncology at the Dana-Farber Cancer Institute.

**Rugang Zhang** is a molecular and cell biologist who focuses on understanding the basis of ovarian cancer development and progression. He hopes to find new biological

markers that clinicians can use to detect early signs of ovarian cancer and develop new drug therapies. Before joining the faculty, Zhang was a postdoctoral associate at the Center. He received his Ph.D. from the Chinese Academy of Sciences, Institute of Biochemistry and Cell Biology, in Shanghai.



### ON THE WEB

To learn more about Fox Chase doctors and researchers, visit [www.fccc.edu](http://www.fccc.edu) or call 1-888-FOX CHASE (1-888-369-2427).

{advance}

## Novel Molecule Could Slow Cancer's Spread, Boost Treatment

A molecule created at Fox Chase may provide a means of slowing cancer's spread and delivering more aggressive drugs directly to cancer cells. Nicknamed "ALM," the small molecule has been shown to halt the growth of breast cancer cells in laboratory tests.

ALM resembles an antibody—a protein that attacks and neutralizes foreign invaders such as viruses or bacteria. However, unlike naturally occurring antibodies, which bind to

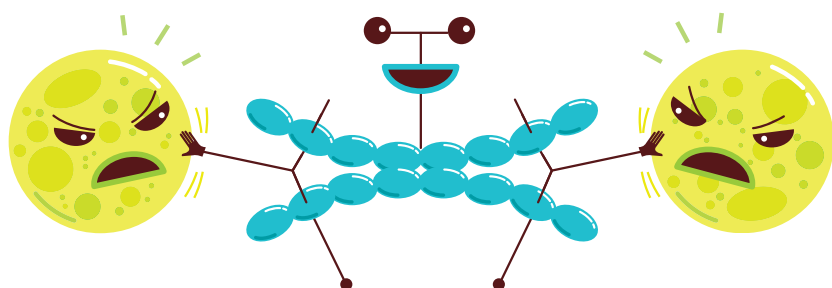
ALM was developed over many years at Fox Chase in the laboratory of Greg Adams, in collaboration with former Fox Chase oncologist Louis Weiner. The investigators created the molecule by linking the active anti-ErbB2 portion from one antibody with the anti-ErbB3 portion of another.

While ALM can stop cancer cells from growing and possibly even metastasizing, it has only a modest ability to kill the cells. The molecule might be best suited not as a weapon but as a delivery system, Robinson says, in that the small amino acid chain that links its two active areas could serve as a "trailer hitch" for stronger, more effective cancer-killing drugs.

"Since ALM is so specific for its target—and since its target is found in great numbers only on cancer cells—it could be used to 'tow' what would otherwise be toxic therapeutics directly to cancer cells without harming nearby healthy cells," Robinson says. "We are currently investigating how best to tether these other molecules to ALM in order to target metastatic breast cancer and related diseases."

Robinson and his colleagues believe that ALM might also provide a means for diagnosing cancer. By connecting it to a "marker" molecule, ALM could be used to detect early-stage cancers or determine the extent of a cancer's spread. The researchers are investigating ALM's diagnostic and therapeutic potential.

*The study was funded by grants from the National Cancer Institute, U.S. Army Medical Research and Materiel Command, the American Cancer Society, the Bernard A. and Rebecca S. Bernard Foundation, and the Pennsylvania Department of Health.*



"In essence, ALM can get between ErbB2 and ErbB3 and hold them apart at arm's length, much like you would if you were separating two fighting children."

only one target at a time, ALM attaches to two targets simultaneously: the signaling proteins ErbB2 and ErbB3, found on the surface of many cancer cells, including head and neck cancer and drug-resistant breast cancer. When connected, the proteins can transmit messages into the cell nucleus that promote cancerous growth.

"In essence, ALM can get between ErbB2 and ErbB3 and hold them apart at arm's length, much like you would if you were separating two fighting children," says molecular biologist Matthew Robinson, lead author of a study published in November in *British Journal of Cancer*.

# Study Suggests Opportunity for Early Intervention in Cancer

A recent Fox Chase study suggests an avenue for identifying those at risk of developing cancer—and stopping the disease before it starts.

People receive one copy of each gene from each parent. More than 30 years ago, Fox Chase researcher Alfred Knudson Jr. revolutionized the field of cancer genetics by showing that, to develop cancer, a person must sustain “hits” to both copies of cancer-inhibiting genes called tumor-suppressor genes. These “hits” can be inherited or environmental: For example, a person might inherit one hit in the form of a nonfunctional gene. The remaining normal copy of the gene would protect against cancer—unless that gene, too, developed a mutation—a second hit—through exposure to carcinogens or some other factor. Knudson’s theory is often called the “two-hit hypothesis.”

Now Knudson and his colleagues offer evidence that a single inherited mutation—a “one-hit event”—is enough to change cells in detectable ways, providing an opportunity to prevent or delay the cancer. The researchers studied patients with an inherited disorder

called familial adenomatous polyposis, or FAP, which predisposes them to colon cancer. FAP patients carry mutations in one copy of their adenomatous polyposis coli, or APC, tumor-suppressor gene, which prevents colon cells from growing out of control and becoming cancerous.

The researchers found that the cells of people with an inherited mutant APC gene look different from normal cells. In particular, the altered proteome—the sum total of proteins a cell creates from its DNA—of mutant APC carriers offers an indication of the cell’s predisposition toward cancer.

“While these cells are just one hit away from becoming cancerous, their altered patterns of protein production may represent new biomarkers of cancer and novel targets for preventive and therapeutic drugs—a chance to strike at cancer before a second hit can happen,” says molecular biologist Anthony Yeung, lead author of the paper.

While the scientists used colon cancer as a model, the findings may be applicable to other forms of cancer. Through genetic testing, it could be possible to identify those who

are at risk of developing cancer because they carry an inherited mutation, Yeung says. These individuals could then take steps to reduce their risk of sustaining a second hit that would lead to cancer, whether through preventive drug therapy or by changing risky behaviors such as smoking or excessive tanning.

The findings were published in September in the journal *Cancer Research*.

Yeung and his colleagues are searching for biomarkers that could indicate a patient’s risk for FAP and perhaps describe how close that patient’s colon cells are to becoming cancerous. The researchers also seek to extend their studies to patients at risk for hereditary non-polyposis colon cancer.

*Funding for the study was provided through the National Cancer Institute, the Fannie E. Rippel Foundation, The Shöller Foundation, the Commonwealth Universal Research Enhancement Program of the Pennsylvania Department of Health, the Pew Charitable Trusts, the Kresge Foundation, and private philanthropy.*

## Clinical Trial Investigates Use of Ultrasound to Relieve Pain from Bone Cancer

Fox Chase researchers are exploring a new method of alleviating the intense pain that can be caused by cancer that has spread to the bone.

While medications, radiation therapy, and surgery are sometimes effective in reducing pain from bone cancer, Fox Chase researchers are investigating a new approach to alleviating the discomfort. It’s called MRI-guided focused ultrasound, and the Center is participating in an international study to see if the method can safely and effectively reduce the pain associated with bone metastases when other treatments don’t help. Fox Chase is the only hospital in the region studying the technology for this use.

“This isn’t a regular ultrasound device you might see at your doctor’s office; it is much more powerful and can be targeted to a small area,” explains radiation oncologist Gary Freedman, one of the lead investigators in the study. “However, like a common ultrasound, this technique also does not involve additional radiation to the body.”

Also known as high-intensity focused ultrasound, or HIFU, the technique has been approved for treating uterine fibroids. It works by focusing high-frequency sound waves to heat a small area, much like using a magnifying glass to burn a hole in a piece of paper. Unlike light, the ultrasound passes through

the skin into the body, where it can be directed to a particular spot.

For this clinical trial, physicians are using MRI to guide them to the area in the bone to which the cancer has spread. With the ultrasound, the physicians can then destroy the nerves that supply sensation to the bone, alleviating pain. The MRI allows physicians to monitor and continuously adjust the treatment.

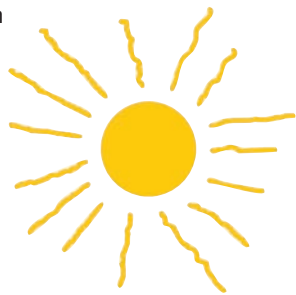
“We’re cautiously optimistic about this approach, but we won’t know how useful it will be until the trial is complete,” Freedman notes. “In time, we also hope that this technology can lead to new techniques to treat tumors in the liver, breast, and prostate.”

## One in Four College-age Adults Suffer from 'Tanorexia'

A survey conducted by Fox Chase researchers reveals that more than a quarter of college-age adults report symptoms of tanning dependence—a craving for the sun (or tanning booths) that holds many similarities to drug or alcohol addiction. The study, published in the September/October issue of *American Journal of Health Behavior*, also found that those with tanning dependence are more likely to be thin and smoke cigarettes, suggesting possible links among risky behaviors in young adults.

"Adolescents and young adults tend to put themselves at risk for skin cancer by exposing themselves to high levels of ultraviolet radiation," says Carolyn Heckman, the behavioral scientist who led the study.

"By understanding some possible reasons why, we hope to develop innovative interventions to help prevent these risky behaviors."



There is some evidence that UV tanning dependence may have biological underpinnings similar to those of other addictions.

Skin cancer is the most common form of cancer, according to the American Cancer Society. The disease accounts for half of all human cancers, with more than a million new cases diagnosed each year in the United States. It is reported that up to 90 percent of skin cancers are associated with ultraviolet radiation.

Heckman and her colleagues recruited 400 students and other volunteers at Virginia Commonwealth University in Richmond

during the spring semester of 2006. Participants were queried about their level of intentional and incidental sun exposure, tanning booth use, and chemical sunless tanner use. The survey also asked about health-related factors such as body mass index, smoking, and exercise.

"The media and lay public may know tanning dependence as 'tanorexia,' alluding to similarities to both substance addictions and body image disorders like anorexia," Heckman notes. "There is some evidence that UV tanning dependence may have biological underpinnings similar to those of other addictions, such as the production of endorphins that produces the 'runner's high.' "

The researchers classified 27 percent of those surveyed as "tanning dependent." Sun tanning appeared to be more closely related to tanning dependence than indoor tanning, though use of indoor tanning during warm weather also signaled dependence.

*The study was funded by the National Cancer Institute.*

## Breast Cancer Survivors Regain Normal Quality of Life, Study Shows

Women with breast cancer who undergo breast-conserving lumpectomies and radiation report being able to resume a normal quality of life within three to 15 years after treatment, according to a survey conducted by Fox Chase physicians. In fact, 10 years after treatment, these cancer survivors report a very high quality of life compared to the general female population of the United States.

"Treatments for breast cancer may decrease quality of life temporarily, but this is evidence that survivors on average will re-

turn to a normal quality of life," says radiation oncologist Gary Freedman, who led the study. Freedman presented his findings in September at the annual meeting of the American Society for Therapeutic Radiology and Oncology.

The survey included 1,050 women with early-stage breast cancer treated with breast-conserving surgery and radiation, with or without chemotherapy and hormone therapy. During routine follow-up visits, the women were asked to complete a brief, standardized questionnaire on health issues including mo-

bility, self-care, anxiety/depression, pain or discomfort, and ability to perform usual activities.

The researchers compiled scores based on a scale of 0 to 1, with 1 being the most positive. Ten years after treatment, the average score for breast cancer survivors ages 18 to 44 was .96, compared to .91 for women of the same age in the general U.S. population. Survivors ages 45 to 64 scored .93, compared to .84 for the general population; and those over 64 scored .76, compared to .81 for the general population.

# Molecular Discovery Could Turn Tables on Drug-resistant Cancer

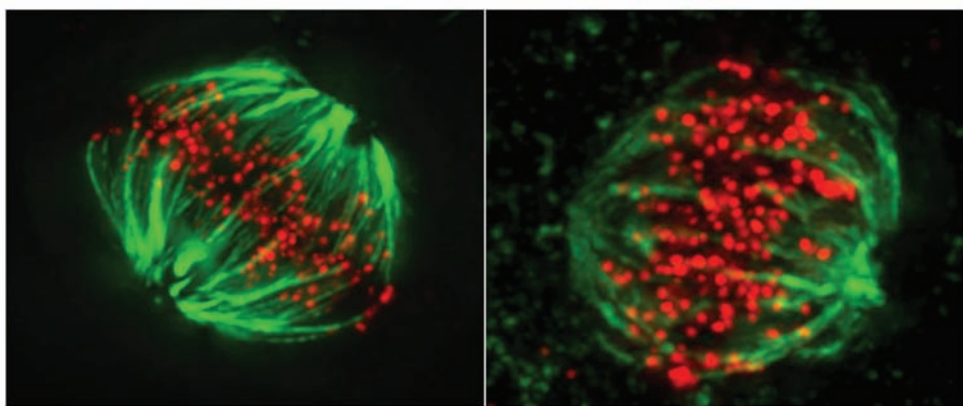
**F**ox Chase researchers have identified a potential means of turning a cancer cell's chief strength—the ability to rapidly evolve past the reach of therapies—into a weakness that can be exploited to stop cancer's growth.

In a study published in October in *The Journal of Cell Biology*, Timothy J. Yen demonstrated how the BubR1 protein controls the sorting of chromosomes in dividing cells. In normal cells, BubR1 evenly sorts the cell's duplicated DNA, in the form of chromosomes, into each new "daughter" cell. When cancer cells divide, however, this process can go wrong and one daughter cell can inherit more—or less—than its fair share of chromosomes, which may confer drug resistance and other cancer-related behaviors on the new cell.

In effect, cancer cells accelerate their own evolution by creating new combinations of genes. Certain combinations prove fatal to daughter cells, but other combinations allow the new cells to survive. As long as the genetic alterations are made on a relatively small scale, cells within the tumor will continually evolve so that they can adapt to a changing environment, Yen says.

"Improper chromosomal segregation is a hallmark of cancer—it scrambles chromosomes and shuffles the genetic deck in a way that helps some cancer cells to evade destruction," he explains. "This shuffling can, in effect, push a cancer cell to evolve in a way that allows it to survive drug or radiation therapy."

By altering BubR1 in the laboratory, Yen and his colleagues were able to mimic the im-



The protein BubR1 controls the sorting of chromosomes in dividing cells. At left, during normal cell division, microtubules (shown as green lines) connect to chromosomes at the spots designated in red and pull them apart. At right, when BubR1 is mutated, the microtubules attach to chromosomes poorly.

proper genetic sorting seen in cancer cells. This ability may provide an opportunity to turn the tables on cancer cells by causing more genetic disarray than even they can handle. Inhibiting the protein could increase the effectiveness of drugs that operate by disrupting cancer cells' DNA replication or preventing their division, thus stopping the cells' growth or destroying them altogether.

*The research was supported by grants from the Leukemia & Lymphoma Society, National Institutes of Health, the Commonwealth of Pennsylvania, and private philanthropy.*

By altering BubR1 in the laboratory, Yen and his colleagues were able to mimic the improper genetic sorting seen in cancer cells.

## PARTICIPATE IN DISCOVERY

To learn more about research at Fox Chase, including how to support research efforts, visit [www.fccc.edu/research](http://www.fccc.edu/research). Information on charitable giving is also available by e-mailing [giving@fccc.edu](mailto:giving@fccc.edu) or calling 215-728-2745.

{close-up}

# Brothers in Arms

## SIBLINGS FIGHT DUAL BATTLES WITH PROSTATE CANCER

By Lisa Bailey

As an accomplished Brazilian Jiu-Jitsu practitioner, Art McKee knows how to protect himself. And as someone with a strong family history of prostate cancer, he has learned to protect his health—a lesson he has shared with his younger brother, Curt.

Many men begin at age 50 to undergo a prostate-specific antigen, or PSA, blood test each year to assess their risk of prostate cancer. In 2007, at just 40, Art was proactive and asked his doctor to test him. He had good reason: His father, grandfather, and four uncles had been diagnosed with prostate cancer.

“With our family history, I knew I had to begin PSA testing early,” he says. “It still came as a surprise when I was told my PSA score was high and warranted a biopsy, which subsequently showed that I had prostate cancer. With no symptoms, that came as a total shock.”

Art researched his options and learned about a new procedure called robotic-assisted prostatectomy, a minimally invasive technique that uses the da Vinci® robotic surgical system. The procedure typically produces a speedier recovery and fewer long-term side effects, such as incontinence and sexual dysfunction, than open surgery. *(To learn more about minimally invasive surgery, see page 10.)*

Art McKee, right, and brother Curt have faced down prostate cancer together.

Art learned that Fox Chase offers robotic surgery, but he also wanted a surgeon experienced with the technology. When he learned that the Center's Rosalia Viterbo had done a fellowship in robotic surgery and performed the procedure hundreds of times, he knew where he wanted to go.

With surgery scheduled, Art decided to tell his brother about his diagnosis. He had encouraged 39-year-old Curt, a Philadelphia police officer, to get tested as well, without success.

“I knew prostate cancer was a possibility, but I didn't really think it would happen to me,” Curt says. “I guess I was in denial.”

When he heard Art's news, Curt gave in to his brother's urging to get checked. When his test and biopsy also came back positive, Curt followed his brother's lead and sought out Viterbo.

Art and Curt underwent surgery eight weeks apart, both with successful out-

comes. Art quickly returned to the activities he enjoys, including martial arts and running. Just 12 weeks after surgery, he took part in Philadelphia's famous 10-mile Broad Street Run.

The brothers enrolled in the Prostate Cancer Risk Assessment Program at Fox Chase, which provides screening, education, and genetic testing for men at increased risk. Art plans to continue those efforts at home. “As the father of three sons, I will educate my boys about their risk,” he says. “I hope that by the time they are men, there will be even better methods of diagnosing and treating the disease. Either way, I will encourage them to get screenings as soon as it is recommended.”

Curt is grateful not only to Fox Chase, but also to his brother. “I spend my nights protecting the lives of the citizens in my territory,” he says. “I never would have guessed that my older brother would be responsible for saving my own life.” ■



Paul Cohen

Fox Chase's leadership in cancer research and treatment is based on a long tradition of pioneering accomplishment.

## THE PHILADELPHIA CHROMOSOME

Discovery revolutionized cancer research, treatment

**FIFTY YEARS AGO**, a landmark discovery at Fox Chase changed the direction of cancer research and paved the way for a new approach to cancer treatment.

The finding came to light when the keen eye of predoctoral fellow David A. Hungerford detected a tiny flaw in chromosomes from the blood cells of patients with a type of leukemia. It was the first genetic defect linked with a specific human cancer.

In 1959, tools did not yet exist to analyze individual genes. Scientists had only crude techniques for studying chromosomes, the 23 pairs of rod-shaped packages of genes at the heart of every blood and tissue cell.

Peter C. Nowell, a pathologist at the University of Pennsylvania, was studying leukemia cells under the microscope when he noticed cells in the act of dividing. To his surprise, their chromosomes—usually an indistinct tangle—were visible as separate structures.

Knowing little about chromosomes, Nowell asked around for someone to work with him. He found Hungerford, who worked in a Fox Chase genetics lab and was writing his doctoral thesis on chromosomes. While conducting his microscopic studies, Hungerford made the seminal observation that certain leukemia cells had an abnormally short chromosome 22. The mutation be-

came known as the Philadelphia chromosome.

Later research found that the defect stems from a DNA swap between chromosomes 9 and 22. While 22 transfers material to 9, thus growing shorter, it also gains a normally inactive growth-promoting gene. That gene fuses with a gene on 22 to become a cancer-causing gene, speeding up cell division and blocking DNA repair.

Arising from this genetic mix-up is chronic myelogenous leukemia, a slowly progressing blood cancer that occurs primarily in adults. Ninety-five percent of CML patients have the Philadelphia chromosome.

### **Gains for researchers and patients**

The discovery provided the first evidence that cancer starts with changes in one or more genes. It galvanized the field of molecular biology—the study of such vital molecules as DNA, RNA, and the proteins that do each cell's work.

The Philadelphia chromosome became an important tool for diagnosing CML and monitoring treatment. More importantly, the linking of culprit genes with cancers led to the creation of targeted drugs that block the effects of cancer-causing mutations. Because these therapies zero in on cancer cells,



Fox Chase researcher David A. Hungerford prepares a camera to photograph specimens under the microscope. Hungerford discovered the Philadelphia chromosome in 1959.

sparing normal cells, they cause fewer side effects.

The first such drug, Herceptin, targets the gene involved in an aggressive form of breast cancer. Gleevec, another targeted therapy, blocks the effects of the cancer-causing gene on the Philadelphia chromosome and has proved effective in treating CML, as well as a rare sarcoma called gastrointestinal stromal tumor, or GIST.

Today, scientists continue to develop innovative new cancer treatments that provide better outcomes for patients, building on a discovery made five decades ago by a young Fox Chase researcher.

—Susan Tobin



*The discovery provided the first evidence that cancer starts with changes in one or more genes.*



## FOX CHASE PHYSICIANS

are national leaders in the use of new, minimally invasive surgical techniques that allow faster recovery for patients. At left, clinicians prepare a patient for robot-assisted surgery, an innovative technique that Fox Chase surgeons use to treat many forms of cancer. A monitor provides a magnified view of the surgical site.

*See story on page 10.*

**FOX CHASE**  
CANCER CENTER

333 Cottman Ave.  
Philadelphia, PA 19111-2497  
[www.fccc.edu](http://www.fccc.edu)