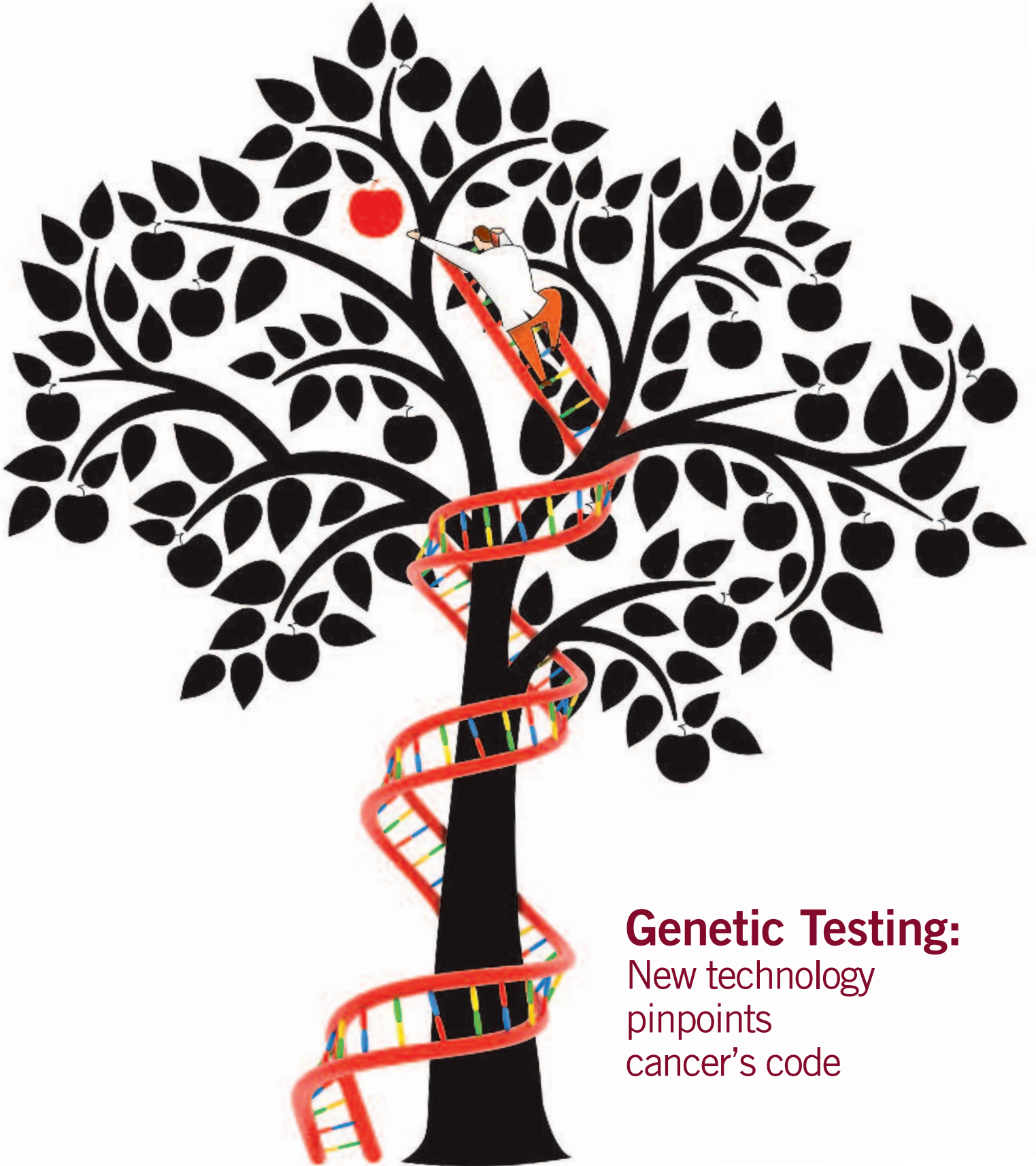


FOX CHASE CANCER CENTER | FALL 2013

broadening
the conversation
about cancer

Forward



Genetic Testing:
New technology
pinpoints
cancer's code

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Shades of a Grandmother

The story on page 26, about how patient Frank Serianni's experience with cancer changed his sense of family, got me thinking—about how we see those close to us, and how that view can be changed by a trauma like serious illness. Like cancer. Such an ordeal can reveal a fuller picture of the people we love, in all its colors.

My maternal grandmother—“Yangee,” to me—has been integral to my life throughout its four decades. When I was growing up, Yangee lived just over a grassy hill from my family in the humble white ranch house she and my grandfather had built. Yangee lived there alone, my grandfather having died when I was a baby. I flew down and back up that hill so many times, my feet could find their way in the dark.

Yangee made me cinnamon toast just the way I liked and gave me dried apricots from the jar in her kitchen, but she brooked few shenanigans. With her erect posture and steely-grey hair, she maintained the efficient, businesslike aspect cultivated through years as a nurse and head administrator of a nursing home. She walked a mile a day and lunged and twisted vigorously in her living room to Jack LaLanne on TV—an effort that left me, as an adolescent, panting on the floor next to her.

When I graduated college and began working in publications, Yangee became my most avid reader, poring over and commenting on each article I wrote.

When she was 80 and I was 24, Yangee was diagnosed with an aggressive form of breast cancer. She underwent a single mastectomy and the removal of a dozen lymph nodes from beneath one arm. The oncologist recommended chemotherapy followed by radiation, then more chemo. They called the regimen “the sandwich.” The doctor told

her it was up to her whether, at her age, she wanted to endure the grueling year-long treatment. Yangee decided she would.

“I thought I might just as well stick around for a while,” she told me dryly, later.

After she started to lose her now-white hair from the radiation, I went shopping with her for a hat. She'd try one on, then pull it off to find the inside strewn with coarse white strands. She shook her head and clucked as she peeled off the offending filaments with thumb and forefinger. She did not buy a hat. Yangee hunched in her coat as we walked back to the car, looking more vulnerable than I'd ever seen her.

Though the radiation made her skin raw and the chemo killed her appetite, I cannot recall Yangee complaining. When my mother checked on her following what had obviously been a rough night, my grandmother would say only, “I think that tomorrow will be better.”

Yangee is now 96. She still goes for walks—albeit with a purple-flowered cane—and still lives in the little white house. When I ate dinner with her at a restaurant on a recent evening, she glowed softly in an autumn-colored sweater and tan wool blazer. Although, at 4'11" and less than 100 pounds, she's smaller than she used to be, she seemed to sit taller than ever in her seat.

—Abbey J. Porter,
Editor



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Epigenetic factors affect how our genes behave in normal human development—and disease.

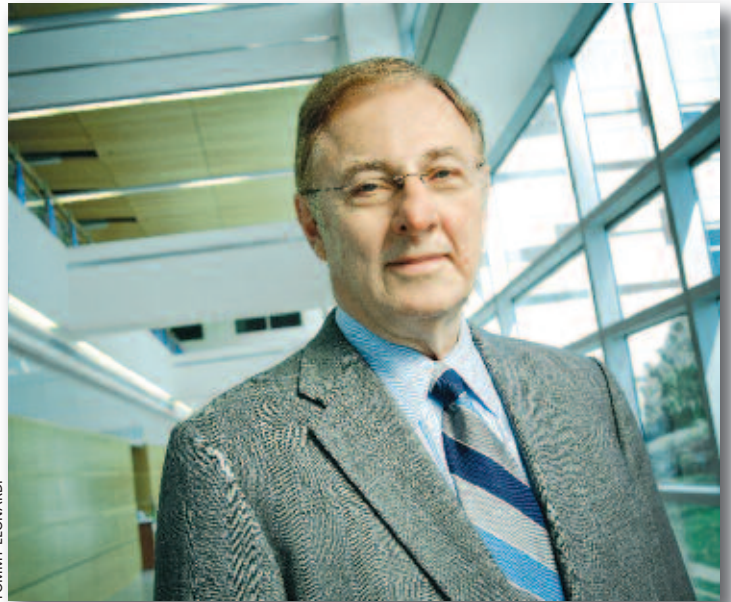


ON THE COVER:

Genetic Testing

Fox Chase is a leader in providing advanced genetic testing, referred to as “next-generation DNA sequencing,” that tests for multiple genetic alterations at once in patients with many different types of cancer. The technology helps to match patients with the best available targeted treatments based on their tumor types.

Story on page 8



TOMMY LEONARDI

HEMATOLOGIC ONCOLOGIST RICHARD I. FISHER is leading Fox Chase Cancer Center during a time of unprecedented transition as it becomes part of Temple University Health System. Fisher, who joined the Center in March as physician-in-chief and interim cancer center director, was named president and CEO in July. Read his take on what lies ahead.

Story on page 18

DEPARTMENTS

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- 28 REWIND:** More than 60 years ago, a hospital created by Philadelphia philanthropist Anna Jeanes sold some of its land to the institute that would become Fox Chase. Today, the Center is helping to realize Jeanes's vision.

Tradition and Evolution

Three diamond-shaped marble statues stand just outside Fox Chase's main entrance, greeting patients and visitors. Created by artist, patient, and former board member Jay Dugan in 1990, the figures represent the Center's primary missions of research, treatment, and prevention.

Long before I first drove up the Center's tree-lined driveway and laid eyes on those sleek, 12-foot-high white sculptures, I felt I knew Fox Chase. Longtime Fox Chase president Robert Young served as one of my earliest mentors, and it was the Center's distinguished reputation that helped draw me to accept a leadership position here early this year. In July, that position transitioned into the presidency—an opportunity I was honored to accept.

The Center is facing particular changes and challenges as it solidifies its identity as a new member of Temple University Health System. The truth is, however, that since its humble beginnings more than a century ago, Fox Chase has never stopped changing. I doubt that the physicians who first mounted the stairs in 1905 to a converted Victorian house in West Philadelphia—the hospital that would become Fox Chase—envisioned the institution becoming what it is today: one of the nation's top cancer research and treatment centers. An ability—indeed, a desire—to evolve to meet changing needs stands among the Center's strengths.

At the same time, the core principles that have driven Fox Chase's achievements to date will drive its future success—namely, an unyielding dedication to the innovative science



TOMMY LEONARDI

and excellence in cancer treatment and prevention represented by Jay Dugan's sculptures, the ideals themselves as enduring as the statues' white marble.

In 1905, that first group of dedicated physicians treated 206 patients with the tools available to them at the time: surgery and radiation therapy. Today, Fox Chase cares for nearly 30,000 patients per year with a full complement of leading-edge medical technologies, including genetic screening that matches patients' individual tumor profiles with the best treatments available. (See story on page 8.)

The stories in the pages that follow detail how, even as it continues to evolve, Fox Chase remains vigilant in providing patients with top-notch care and progressing in its mission of prevailing over cancer. In my new role, I am proud to be part of those efforts.

Sincerely,
Richard I. Fisher, M.D.
President and CEO

Forward

FALL 2013

EDITOR

Abbey J. Porter

CONTRIBUTORS

Writing

Karin Beuerlein
Jenni Laidman
Alison McCook

Photography

Jessica Hui
Joe Hurley
Tommy Leonardi
Scott Spitzer

Illustration

Rob Murray/
ieatgravity.com

EDITORIAL SUPPORT

Ashley Kuhn
Maddy Weber

DESIGN

AcquireVisual.com
Karlyn Rosen Aires

RESEARCH

The Talbot Research Library
at Fox Chase

PRINTING

Triune Color Corporation

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Study Points to Impact, Productivity in Fox Chase Research



TOMMY LEONARDI

Fox Chase is home to some of the most prolific and high-impact scientists in the nation, according to an analysis of recent studies published in peer-reviewed journals that focus on cancer and basic biological sciences.

Among 41 federally designated comprehensive cancer centers in the United States, Fox Chase researchers ranked seventh in overall productivity from 2002 to 2011, measured by number of published papers. In certain categories, the institution ranked even higher—specifically, in radiology, nuclear medicine, and medical imaging (all ranked in fourth place), and surgery and oncology (both ranked sixth).

But simply publishing papers is not enough—some papers have more impact than others, meaning they influence other scientists or lead to further research. In science, the impact of a particular paper is often measured by citations, or the number of times subsequent articles list that paper among those that influenced the current work. When comparing the average number of citations per paper among U.S. comprehensive cancer centers from 2002 to 2011,

Fox Chase emerged in third place for research in urology and nephrology, fifth place in surgery, and 10th in radiology, nuclear medicine, and medical imaging.

Finding new cancer treatments depends on innovative discoveries, and the analysis shows that Fox Chase is leading the way in pioneering science, says Franklin Hoke, vice president for communications at Fox Chase. “The future of cancer medicine lies in the labs,” Hoke says. “This analysis highlights Fox Chase’s ability to outperform many larger competitors in research productivity and impact.”

The purpose of the analysis, commissioned by Fox Chase and performed by the research analysis group at Thomson Reuters, was to determine Fox Chase’s existing research strength and help guide strategic planning as the cancer center combines its research enterprise with that of Temple University Health System, with which it recently merged. “Our research capabilities have expanded since the merger,” Hoke says. “We expect the synergy between Fox Chase and Temple to propel us even higher in future rankings.”

Physicians Named ‘Best Doctors in America’

Fox Chase doctors rank among the nation’s best, according to the Best Doctors in America® list for 2013. Twenty-eight Fox Chase doctors were among 83 Temple University Health System physicians receiving the honor. Only 5 percent of the doctors in America make the list, which is compiled and published by Best Doctors Inc®.

The individuals named to the “Best Doctors” list were nominated by fellow physicians and selected through a peer-review process. The doctors are recognized for providing the most advanced medical expertise and knowledge to patients with serious health conditions.

“We are proud of the 83 Temple physicians named among the best doctors in the nation,” said Larry R. Kaiser, president and CEO of Temple University Health System and dean of Temple University School of Medicine. “These physicians and the more than two dozen specialties they represent are a reflection of the high quality of care Temple patients receive.”

Attention readers

Share your opinion of *Forward!* Please visit tinyurl.com/fwdsurvey to take our brief reader survey. We’ll share results in an upcoming issue and consider your feedback in planning future content. Thank you!

—Abbey J. Porter, Editor

Safeguarding Against Scarcity:

THE IMPACT OF DRUG SHORTAGES ON PATIENT CARE BY DWIGHT D. KLOTH, DIRECTOR OF PHARMACY

Fox Chase, like every other hospital in the United States, faces daily challenges caused by the ongoing nationwide shortage of vital medications. What was once an occasional headache has become a constant threat to safe and cost-effective patient care. In this editorial, director of pharmacy Dwight D. Kloth discusses the ongoing challenges the drug-shortage problem poses and describes some of the steps Fox Chase is taking to mitigate it and ensure that patients receive the best care possible.

Over the past decade, we have seen annual escalations in the length and severity of drug shortages across the United States. The problem is nationwide in scope and is not limited to a particular disease or therapy, but with just a few notable exceptions, it has been limited to sterile, injectable generic medications, a category of drug vital to the care of severely ill cancer patients. Far more so than the tablets or capsules that may be more familiar, these injectable medications require extremely complicated manufacturing and sterility control processes to ensure safe intravenous administration. Despite the complexity and cost of manufacturing these drugs, they typically cost just a few dollars per dose—sometimes even less. Perhaps not surprisingly, given the difficulty of producing them, such medications constitute the bulk of those prone to scarcity.

During each of the three years from 2010 to 2012, the FDA tracked more than 200 acute drug shortages. As of press time, the “Drug Shortages” page on the FDA website (see www.fda.gov; select “Drugs” at top and “Drug Shortages” under “Spotlight”) listed acute shortages in 120 medications, and the Fox Chase pharmacy department was monitoring or had mitigation steps in place to deal with more than 50 shortages with the immediate potential to affect Fox Chase patients.

There isn't a single cause underlying the scarcity; rather, the causes are multiple and variable. Contributing factors include an increasingly global supply chain for active pharmaceutical ingredients, or APIs—the drugs' raw ingredients—which leads to unpredictable supply consistency; challenges for end-product manufacturers includ-

ing plant de-certifications by the FDA that lead to production and supply disruptions; mergers within the generic manufacturing sector that decrease the number of companies in the generic marketplace; and government-imposed restraints on price adjustments that can make it difficult for manufacturers to maintain or improve their plants. Medication “hoarding” by people in the

of a particular drug are nearing a critical point, the department, in consultation with the multidisciplinary Pharmacy and Therapeutics Committee, advises the physicians whose patients would be affected. In a worst-case scenario—for example, during the national shortage of liposomal doxorubicin (known by the trade name Doxil®)—the pharmacy department and the committee worked



JOE HURLEY

“grey market” (think of ticket scalpers, but life-saving medications are involved instead of concert tickets) also can exacerbate shortages.

The Fox Chase pharmacy department is devoted to maintaining patient care and invests tremendous time and effort in procuring sufficient supplies of the vital medications needed by our patients. The department's drug shortage team can spend hours per day monitoring drug availability, communicating with drug companies, developing contingency plans, and working with Fox Chase physicians.

The pharmacy department works with patient care teams to ensure that patients get the medications they need. If supplies

with physician leaders to ration the drug so that the patients with the greatest need were able to receive doses from the extremely limited supply. The Doxil shortage also represented the only time, to date, that Fox Chase was forced to suspend accrual of patients to a clinical trial, due to a nationwide shortage of a medication.

Within Temple University Health System, Fox Chase, neighboring Jeanes Hospital, and Temple University Hospital work together to meet patients' needs, sometimes sharing scarce medication supplies. The department of pharmacy also has worked for many years with regional hospitals outside of TUHS. It was espe-

During each of the three years from 2010 to 2012, the FDA tracked more than 200 acute drug shortages.

cially heartwarming for us when we were able to loan cytarabine, a medication with an 80 to 90 percent cure rate for pediatric leukemia, to a nationally known pediatric hospital when it was on the brink of cancelling treatments. That hospital subsequently was able to loan us enough cisplatin—a drug used to treat a variety of cancers—that we were able to avoid suspending accrual to several clinical trials.

Fox Chase also has worked for many years with outside organizations such as the Institute for Safe Medication Practices, a national organization dedicated to patient safety, and since 2011 has served as a resource for the staff of Sen. Robert Casey of Pennsylvania. Casey co-authored, with Sen. Amy Klobuchar of Minnesota, a bill designed to give greater authority to the FDA to mitigate the number and severity of medication shortages by increasing its ability to forecast supply problems.

Data available so far in 2013 suggest that the availability of medications is gradually and modestly improving, but the Fox Chase pharmacy department and others across the country continue to face the daily challenge of drug shortages and potential shortages as we work to ensure the safety and wellbeing of our patients. ♦

Dwight D. Kloth has been an oncology pharmacist since 1979 and is board certified in oncology pharmacy. He is a Fellow of the American College of Clinical Pharmacy and a founding member of the Hematology Oncology Pharmacy Association. He represents Fox Chase on two guidelines panels of the National Comprehensive Cancer Network and is an advisor for oncology medication safety issues for the Institute of Safe Medication Practices.

National Network Announces Survivorship Guidelines

While there has long been a widespread commitment to the detection, diagnosis, and treatment of cancer, there has been less recognition of the health care needs of survivors. The National Comprehensive Cancer Network, a nonprofit alliance of 23 of the world's leading cancer centers, issued its first survivorship guidelines for the treatment of the late- and long-term effects of cancer at its annual conference in March.

According to the National Cancer Institute, there are more than 12 million cancer survivors in the United States; one in three suffers from physical or mental health problems as a late-term effect of cancer.

The guidelines cover eight areas: anxiety and depression, cognitive function, exercise, fatigue, immunizations and infections, pain, sexual function, and sleep disorders. Assessment of survivors' needs and concerns by a physician is encouraged on a routine basis by

using the assessment tool, a list of two to three questions on each of the criteria.

Fox Chase medical oncologist Crystal Denlinger, who chaired the NCCN panel that developed the guidelines, leads the Center's survivorship initiative, an effort to raise awareness of and address the potential late- and long-term effects of cancer and its treatment. The initiative's goal: to provide the best quality of life for patients.

"The survivorship program is looking at the experience of the cancer survivor, what life is really like for them," Denlinger says.

As part of its survivorship program, Fox Chase implemented survivor clinics to which patients are referred two or more years after the completion of any surgery, chemotherapy, or radiation treatment. There, certified registered nurse practitioners and physician assistants develop a personalized survivorship plan, and patients are advised about lifestyle factors such as nutrition and exercise and monitored for recurrence.

'Cancer Conversation' Revisits Revolutionary Discovery

A breakthrough discovery in cancer genetics was brought back into the spotlight at Fox Chase in May when science writer Jessica Wapner discussed her book, *The Philadelphia Chromosome: A Mutant Gene and the Quest to Cure Cancer at the Genetic Level*. More than 200 scientists, clinicians, patients, and members of the public attended the event, which was a part of Cancer Conversations, a series of talks about cancer by authors and filmmakers.

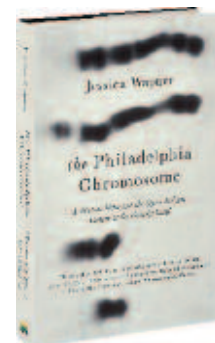
"The way Wapner repeatedly adds up preceding steps to build to the scientific breakthrough is masterful, making for compulsive, surprisingly emotional reading," *The Scientist* magazine commented on Wapner's book.

The Philadelphia chromosome was discovered in 1959 under the microscope of David Hungerford, a Fox Chase graduate student, working in collaboration with Peter Nowell, a researcher from the University of

Pennsylvania School of Medicine. Identification of the chromosomal abnormality in certain leukemia cells provided the first evidence that cancer starts with changes in one or more genes. More than 50 years later, Wapner's book chronicles the discovery and its seminal relationship to the field of cancer genetics.

While it took decades for the Philadelphia chromosome to translate into a therapeutic agent, the discovery set off the chain of investigation that led to Gleevec®, a pill that transformed the once-fatal condition of chronic myeloid leukemia into a manageable disease.

Members of the Hungerford and Nowell families attended the event, where guests could look through the microscope with which the discovery was made. The author also signed copies of her book, which was released the day of the talk, following her presentation.



I N B R I E F

□ **CENTER HONORS ASSOCIATION LEADER**

Fox Chase recently honored Margaret Foti, CEO of the American Association for Cancer Research, with the 2013 Stanley P. Reimann Honor Award for her significant contributions to cancer science and medicine. Fox Chase bestows the award on individuals from varying spheres of influence who bring exceptional ingenuity and expertise to the cancer cause. "Margaret's contributions to cancer science and medicine are deep and far-reaching," says Jonathan Chernoff, Fox Chase's chief scientific officer. "She is an invaluable thought leader and a builder of purposeful coalitions of individuals who strive to understand, prevent, treat, and ultimately prevail over cancer."

□ **NEW PROSTATE TESTING GUIDELINES ISSUED**

In the past, men 50 and older have been encouraged to get a yearly prostate-specific antigen, or PSA, screening test for prostate cancer. However, at its annual meeting in May, the American Urological Association recommended against screening average-risk men under 55 or any man over 70 using the controversial blood test. The organization said that men between those ages should weigh the potential benefits and harms of screening and consult with their doctors on the best approach. Richard Greenberg, chief of urologic oncology at Fox Chase, agrees. He told the news agency Reuters that the PSA test is "not a great test," but that it has made it less common for cases of prostate cancer to reach advanced stages. "To just say, 'You shouldn't do screening because there's no benefit,' is I think the wrong message," he added.

□ **NURSES HONORED**

Two Fox Chase nurses recently became the latest recipients of the DAISY Award, which recognizes the "super-human work nurses do for patients and their families every day." The quarterly award—an international honor sponsored by the DAISY Foundation—came to Fox Chase in 2012. Amy Keenan, an infusion room nurse, became the first recipient to be nominated by a patient, and Mariellen Smith, a radiation oncology nurse, was the first to receive multiple nominations by patients and colleagues.

Fox Chase Hosts High School Students

Nearly 160 high school students attended a symposium at Fox Chase in March to learn about careers in health care. The students attended research and clinical lab-based sessions, as well as administrative sessions that focused on topics such as health disparities, finance, and human resources. The day-long event was part of a three-phase launch of the Center's newly redesigned high school student scientist program.

"The idea is to introduce students to the variety of careers available within a medical institution," says Fox Chase developmental biologist Alana O'Reilly, who heads the program.

The symposium was open to all area high school students. The launch also included, for selected students, a 10-week "Immersion Science Laboratory" research training course, followed by independent research projects, which took place over the summer at Fox Chase.

Sixteen students who took the course were chosen to do projects in Fox Chase laboratories. They conducted research on topics of their choosing, including analysis of tumor stromal interactions; the effects of new drugs on ovarian, pancreatic, or intestinal cancer development;

and analysis of developmental pathways important for tumor development. Students' coursework and data will be included for publication in a peer-reviewed journal.

"We anticipate that our redesigned program will catalyze an interest in science in many students in Philadelphia and the surrounding counties," O'Reilly says. The early exposure to science, she says, can be crucial in inspiring students to pursue careers in health care and scientific research.

Since 1982, the program has brought a select group of talented high school students to the Fox Chase campus each year to work in labs with Fox Chase scientists as their mentors. While the program gave budding scientists a firsthand look at biomedical research, it reached only about 10 students per year. This year's re-imagined effort plans to reach dozens more students through the classroom component by working with teachers to prepare them to teach the research training course in their high schools.

"The old program gave students a great opportunity to get lab experience but was very selective," O'Reilly says. "We wanted to expand the opportunities."

Gift Creates Two Endowed Chairs

A substantial financial commitment from Fox Chase supporters has created two new endowed chairs at the Center. A \$4 million gift from Carol and Louis Della Penna Sr. has created the Carol and Louis Della Penna Chair in Urologic Oncology and the Louis Della Penna Chair in Head and Neck Oncology.



Congratulating new endowed chair holders Richard E. Greenberg, right, and John A. "Drew" Ridge are Louis and Carol Della Penna, left, whose recent financial commitment created the two new endowed chairs.

"The doctors, nurses, and researchers at Fox Chase have dedicated their lives to helping people prevail over cancer," says Louis Della Penna, a member of the Center's board of directors. "Carol and I are indebted to this tremendous community of consummate caregivers and innovators. We feel great excitement about Fox Chase's future and hope our commitment conveys a measure of our confidence in its people and mission."

The inaugural holders of the chairs are Richard E. Greenberg, chief of urologic oncology, now the Carol and Louis Della Penna Chair in Urologic Oncology; and John A. "Drew" Ridge, chief of head and neck surgery, now the Louis Della Penna Family Chair in Head and Neck Oncology. With a combined 50 years at Fox Chase, the two physicians have treated thousands of cancer patients, including Louis Della Penna himself.

Endowed chairs provide funding for promising research and a means of rewarding outstanding physicians and scientists.

National Group Inducts Fox Chase Scientists

The American Association for Cancer Research honored two Fox Chase scientists—Alfred G. Knudson Jr. and Beatrice Mintz—for their distinguished contributions to cancer science by inaugurating them into the first class of the Fellows of the AACR Academy.

The AACR Academy—created to honor scientists whose contributions have propelled significant innovation and progress against cancer—inaugurated 106 individuals at the April ceremony, the number reflecting the age of the organization.

“Membership in the Fellows of the AACR Academy will be the most prestigious honor bestowed by the American Association for Cancer Research,” said Margaret Foti, chief executive officer of the AACR.

Mintz’s pioneering work involving chimeric and transgenic mice and stem cells and the tumor microenvironment has greatly advanced the techniques that scientists use to study the genetic mechanisms that drive cancer progression.

Knudson is internationally recognized for his “two-hit” theory of cancer causation, which explained the relationship between the hereditary and non-hereditary forms of cancer and predicted the existence of tumor-suppressor genes that can repress cancer cell growth. The now-confirmed theory has advanced the understanding of errors in the genetic program that turn normal cells into tumor cells.

Fox Chase Earns Top Billing in Nation, Region

Center Ranked Highly by *U.S. News & World Report*, *Consumer Reports*, *The Scientist*

Fox Chase has placed highly in several prestigious regional and national rankings. As in the past, the Center has been listed among the best hospitals in the country for cancer care by *U.S. News & World Report*. In the 2013-14 rankings, released in July, Fox Chase ranked 30th in the nation in cancer care. The Center also ranks highly among hospitals in Pennsylvania and the Philadelphia metropolitan area.

“This important national ranking gives everyone at our Center—from physicians to nurses to administrators and even volunteers—a sense of pride in what we do here at Fox Chase,” says Richard I. Fisher, Fox Chase president and CEO.

Additionally, Fox Chase was ranked as high performing in the specialty areas of gynecology, nephrology, and urology. Among all hospitals, it ranked 11th in Pennsylvania and seventh in the Philadelphia metropolitan area.

The rankings are based on factors including a national survey that asks physicians to rate institutions on reputation, as well as types of facilities available, services offered, patient safety, and outcomes.

In addition, a new *Consumer Reports* study rated Fox Chase as having the best surgical outcomes of any hospital in Philadelphia.

The study, which examined the mortality rates and length of hospital stays for various types of elective surgeries, looked at patients from 2,463 hospitals nationwide, including 32 in the Philadelphia area.

“This is an emphatic validation of our longstanding commitment to patient safety and dedication to achieving the best outcomes for our patients,” Fisher says.

The study looked at Medicare claims data from 2009 through 2011 for patients undergoing 27 categories of common scheduled surgeries.

Finally, scientists ranked Fox Chase as a “Best Place to Work” in a national survey. *The Scientist* magazine’s Best Places to Work in Academia survey, which ranks the top 20 institutions to work for when it comes to conducting academic research, lists Fox Chase as seventh—with high marks for job satisfaction, as well as tenure and promotion.

Full-time life scientists working in academia or at noncommercial research institutions were invited to take part in an online survey. The questionnaire asked respondents to assess their working conditions and environments according to 37 criteria in eight areas.

The results appeared in the August issue of *The Scientist*.

‘International’ Effort Advances Medical Care in China

As a part of its effort to create cooperative coalitions with hospitals around the world, Fox Chase International has forged several alliances in China and recently inaugurated the American Fox Chase Cancer Center in the Chinese city of Xi’An.

The program focuses especially on China, where health care standards and training lag in the face of an explosive increase in cancer, says Kurt Schwinghammer, vice president of the research and development alliances office

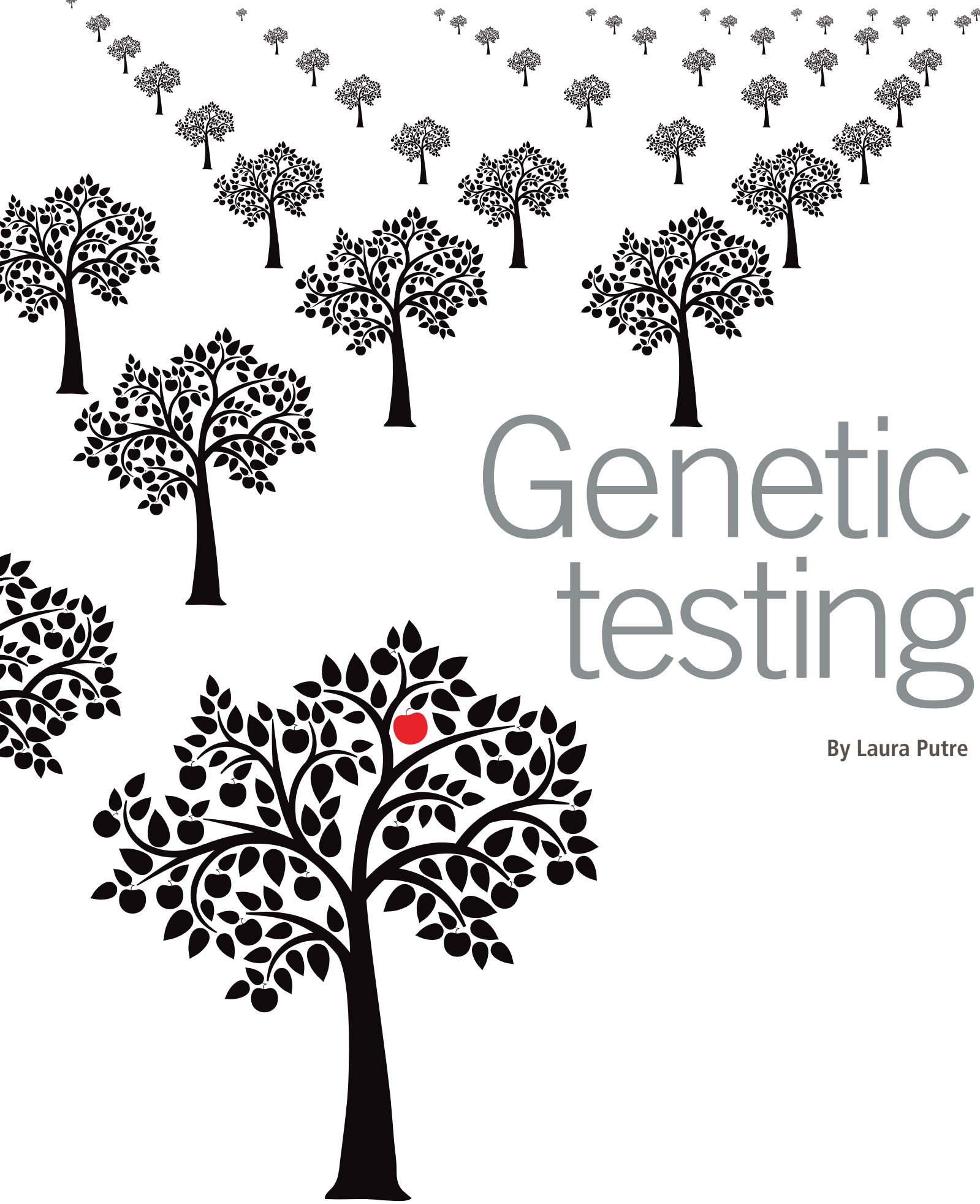
at Fox Chase and head of Fox Chase International. “Cancer is going to be a burden to China beyond belief by the year 2020,” Schwinghammer says. “Walk through the hospitals, and there are four to five patients to a room, and patients in the hallway.” Chinese hospitals want to improve their level of care, he adds, and Fox Chase is helping several to do so.

Fox Chase will provide the new cancer center with support of management, treatment, technology, and research. That support

includes protocols and clinical practice guidelines in disciplines including surgery, chemotherapy, radiotherapy, and prevention.

“The opening of the American Fox Chase Xi’An Cancer Hospital is a major step forward for Chang’an Hospital, and this partnership will lead to improved cancer care in our region,” said Liangfu Han, chief medical officer and director of Chang’an CMS Cancer Institute.

The two organizations will jointly conduct clinical and basic research and share information and research results.



Genetic testing

By Laura Putre



New technology pinpoints cancer's code

When Heidi Henn, a mother of two and a program manager for the U.S. Navy, started having trouble breathing in October 2011, she thought it might be heart problems. Heart disease ran in her family, after all. But when a surgeon at George Washington University Hospital in Washington, D.C., did a biopsy, he found that Henn's lungs, not her heart, were causing her problems.

A nonsmoker all her life, Henn was stunned to find out she had stage 3 lung cancer. She quickly started chemotherapy, but the treatment didn't help. The cancer was still spreading, and the chemo gave her nausea and fatigue that left her bedridden and miserable.

Because Henn was only 48—young for a cancer patient—and had never smoked, her oncologist wondered whether her cancer might be linked to a genetic mutation and could be treated with a new generation of cancer drugs called targeted therapies. That's when he had her tumor samples sent off for a pair of genetic tests that look for common mutations linked to certain types of lung cancer. Patients with such mutations sometimes improve when treated with targeted therapies, which work on specific molecules in the body to block cancer growth. ▶

Taking aim

Targeted therapies are different from chemotherapy in that they are tailored to reach the cells that cause tumors to grow and spread. Chemotherapy, on the other hand, can harm normal cells along with cancer-causing cells—but can also be especially effective in combating certain cancers, like testicular cancer. Targeted therapies are sometimes used alone, sometimes in combination with other targeted therapies, and sometimes with chemotherapy.

Henn's doctor's instincts were right. Henn tested positive for a mutation that causes overactivity of the enzyme ALK, and in February 2012 she was started on a targeted therapy called crizotinib, a pill that the FDA had approved just six months before. The drug worked initially, and when it stopped working her oncologist suggested trying chemo again. But Henn, who lives in southern Maryland, had done her research and found a clinical trial at Fox Chase for an experimental targeted therapy called LDK378.

"When it's a matter of life and death, you get smart any way you can," Henn says of her quest to find the best treatment, even if it meant traveling outside the state. "My daughter is 18 and my son is 15. I definitely want to be around for my kids."

In January, with the cancer spreading to Henn's brain, doctors at Fox Chase began treating her with the experimental drug, which is designed to decrease the activity of the defective gene linked to the cancer's spread. Within two weeks, Henn started feeling better. Her next scan, on February 15, showed a dramatic reduction in the size of her lung tumors. Three of four of her brain lesions were no longer measurable, and the remaining one had shrunk by half.

Though it's too early to tell whether the drug will work in the long term, "I'm thrilled it seems to be successful in crossing to the brain," Henn says. "It's very rare that chemo drugs do that." The drug has since eradicated the cancer in her lymph nodes and a lesion on her liver, and even the largest brain tumor can no longer be measured.

Henn is exercising again and has gone back to work part-time. "I'm feeling almost normal," she says. "My quality of life is incredible."

A changing landscape

Cancer treatment has been changing rapidly since the FDA approved the first targeted cancer therapy, tamoxifen, for the treatment of breast cancer more than 30 years ago.

In 1992, the National Institutes of Health began mapping the human genome—sequencing all 3 billion base pairs



"The biggest challenge is getting this technology and this sort of knowledge—these new tools for cancer care—from the laboratory to the patient."

*– Jeff Boyd, executive director,
Cancer Genome Institute*

in human DNA. That project, completed in 2003, has so far led to the discovery of more than 1,800 genes linked to various diseases, according to the NIH, and opened wide the development of therapies that target them. It's given scientists a detailed map of the makeup of human DNA. Instead of having the sole option of traditional chemotherapy—which may act more like a bludgeon than a scalpel—today's cancer patients may be able to take a specialized pill or injection to either eradicate their cancer or keep it under control. That's the case for those with chronic myeloid leukemia, or CML; a medication called Gleevec[®], which was introduced in 2000 and targets an abnormal protein present in most CML sufferers, has extended patients' survival rates from a few months to indefinitely. The drug may benefit patients with other diseases as well.

One Fox Chase patient with melanoma is living proof of the difference that targeted treatments can make. Before the man, now 73, started targeted treatment, "he had an expected survival rate measured in months," says his doctor, Anthony Olszanski, a Fox Chase oncologist and drug-development researcher. "I started him on Gleevec, and he had a complete response. We cannot find his disease. He's been on therapy for over two years, and he's capable of doing the things he wants to do."

'Where the excitement is'

The latest advances in gene sequencing allow doctors to test for many genetic alterations at once, in patients with many different types of cancer. At Fox Chase's new Cancer Genome Institute, a single tissue sample can be tested for 50 genes and hundreds of genetic mutations related to cancer. Not all of the mutations have therapies available, but the hope is that eventually, they will.

The multidisciplinary Institute provides the 50-gene test using new technology referred to as "next-generation DNA sequencing" to help guide the treatment of patients with advanced cancers and, when appropriate, match them with the latest trials of targeted drugs. The genetic information collected from the test goes into patients' medical records with their other personal health information. With informed consent from the patient, the data is also included in an



JESSICA HUI

institutional review board-approved data registry without the patient's name or other identifying information (such as address or social security number). Researchers can access the data and patient characteristics like race, ethnicity, and age to see how certain types of patients are responding to clinical trials.

Such multiple-gene testing "is where the excitement is," says Olszanski, the Institute's senior medical advisor. "We know about this one gene that's important in colon cancer, but we do not know about many other genes that may be important. And we think that if we study a number of patients with colon cancer, for example, we will find other important changes in DNA that will allow us to treat them more effectively."

Formally launched in January, the Institute strives to promote precision medicine—or medicine specifically tailored to each patient at the molecular level—in oncology through patient care, prevention research, partnerships, and educa-

tion. The Institute brings together doctors, scientists, and pathologists from various disciplines at Fox Chase who not only are up on the latest research and have the best technology at their disposal, but also can bring those advances to the patient in a meaningful way—interpreting and explaining test results in ways patients can understand, enrolling them in clinical trials for experimental therapies, and monitoring their progress on a long-term basis.

"The biggest challenges aren't the technology or the bioinformatics that go along with interpreting the data," says Jeff Boyd, the Institute's executive director and an expert in the genetics of breast, ovarian, and endometrial cancer. "The biggest challenge is getting this technology and this sort of knowledge—these new tools for cancer care—from the laboratory to the patient." Which is what the Institute is doing.

The Cancer Genome Institute provides a 50-gene test to help guide the treatment of patients with advanced cancers and match them with approved or experimental drugs.

On trial

With the help of \$2.9 million in funding from Temple University, the Institute is offering its services through a series of clinical trials in which certain patients are eligible to participate. Boyd calls the funding from Temple "tremendous," adding, "It allows us to undertake exciting and important clinical research, the goals of which are to generate useful scientific findings and advance clinical care."

Igor Astsaturov, a Fox Chase medical oncologist and researcher who works closely with the Institute, says 30 or 40 of his patients already have undergone genetic testing at Fox Chase or other institutions as part of their treatment. Binders on his desk are filled with their tumorgenetic profiles, information that helps him determine the best treatment options.

In the case of one of Astsaturov's patients with a rare type of gastrointestinal tumor called neuroendocrine ▷

FAQs: Genetic testing and targeted therapies

with Anthony Olszanski, senior medical advisor,
Cancer Genome Institute

Who can benefit most from genetic testing?

I see a number of patients with late-stage disease where we are, unfortunately, running out of standard treatment options. And that's where I think that genetic testing really makes sense. Then we can possibly identify targets that we can inhibit with new targeted drugs, most often on clinical trials, which may make a difference for patients who are running out of options.

How do targeted medications work in cancer treatment?

Many of them are given as tablets or pills; others need to be given as intravenous medications. They work by different mechanisms to block the growth of cancer cells. Some of them target receptors on the cell surface, and some attack signaling pathways inside the cells. One interesting approach is to combine a targeted therapy with a chemotherapy drug. These combinations are called antibody-drug conjugates. The goal of these drugs is to use the targeted portion to seek out tumor cells. It's like the Trojan horse. The tumor cells ingest or engulf the antibody-drug conjugate, and the toxic therapy is released inside the tumor cells and specifically kills those cells, sparing most healthy cells.

Are certain types of cancer more appropriate than others for genetic testing and targeted therapy?

That's part of what we're trying to figure out. We do know that some types of cancer harbor more genetic mutations than others, but we do not know the mutation status on some cancers. For example, we know that lung cancer, breast cancer, and colon cancer have high mutation rates. But there's not a lot of data out there to tell us about the mutation rate in neuroendocrine tumors, for example. Part of the reason we're doing these studies is to try to learn the details about how many mutations occur in each type of cancer, how often we can find a targeted therapy for an individual patient, and how often that therapy actually works.



JOE HURLEY

carcinoma, unexpectedly finding a mutation of the C-KIT gene resulted in starting the patient on a targeted therapy that in four months substantially reduced the size of the person's tumors.

In the coming months, the Institute plans to enroll about 200 patients in five clinical trials of genetic testing related to lung, colorectal, rectal, and neuroendocrine cancers, as well as of the efficacy of using genetic sequencing to guide therapy. Which patients will qualify for the free testing is not yet clear.

"We won't discourage the testing based on cancer type," Olszanski says, noting that the various targeted therapies have had an effect on a "pretty wide range" of cancers. "But we sometimes will discourage it based on when the patient was diagnosed. If they've not yet received the standard of care, we generally tell them that we think the test will be better for them later."

Just the start

Fox Chase has long been a pioneer in the field of cancer genetics. The first link between cancer and a genetic abnormality was discovered in 1960 by David Hungerford of Fox Chase's Institute for Cancer Research and Peter Nowell from the University of Pennsylvania School of Medicine. Their discovery of the Philadelphia chromosome, a chromosomal abnormality in patients with chronic myeloid leukemia, paved the way for the eventual development of Gleevec.

As a National Cancer Institute-designated comprehensive cancer center, Fox Chase has an obligation "to move the field of personalized medicine forward," Boyd says.

Charis Eng, director of the Genomic Medicine Institute at Cleveland Clinic, agrees. Eng says that every cancer center "worth its salt" is either testing for genetic alterations in cancerous tumors or will soon be doing so. With dozens of targeted therapies already approved or in clinical trials, he says, "this is the time that if you find certain types of alterations, you can say, 'Yes, let's choose this type of treatment and yes, the tumor will respond.'"

With more than 25,000 genes in a single human (though not all are linked to disease), the Institute's 50-gene test captures just a fraction of the potential for genetic testing.

Plans call for testing even more genes.

"The more we learn about certain cancers and genes and drugs—which is just a matter of time and experience—then the number of patients we can help will obviously increase," Boyd says.

Questions and quandaries

Even as it opens the door to new hope and knowledge, genetic testing also raises fresh issues and questions. One concerns cost: the test is expensive to provide, running institutions up to more than a thousand dollars per tumor—and whether insurance companies will reimburse that cost remains an open question.

Olszanski predicts the answer to that question will be “yes” and that within the next year, insurance companies will begin to cover the cost of providing the test. “I think they will have no choice,” he says. “They already cover other tests that have clinical validity.” Insurance companies look at data on positive outcomes, he reasons, and there will be more such data available as more patients undergo genetic testing and targeted therapies.

Privacy is another concern for those who undergo testing. Is anyone’s genetic information completely confidential? In January, a researcher publishing in the journal *Science* was able to uncover the identity of five people and 45 of their family members using “blind” genetic data posted online, as well as information that anyone can access on genealogy websites.

Theoretically, someone with access to a genetic database could identify people through that data, Boyd says. But they could not use the information in any meaningful way. Federal law prohibits health insurance companies from using genetic information to raise rates or deny coverage.

At Fox Chase, genetic test results are placed into a patient’s electronic medical record like any blood test or CAT scan would be. The information is kept private under HIPAA laws, which prevent the sharing of medical information without a patient’s consent. “It is not available to insurance companies, and it is not available to employers,” Olszanski says.

The test results are also entered into an institutional review board-approved research registry at Fox Chase that may include the patient’s age, characteristics of the tumor, and type of follow-up treatment. Identifying information such as the patient’s name, location, and social security number are not included. Boyd says the registry is “vitaly important” to advancing research and



JESSICA HUI

Genetic test results are kept private under HIPAA laws, which prevent the sharing of medical information without a patient’s consent.

providing data to show whether genetic sequencing provides a path to better cancer care.

Another issue arises in about 1 percent of cases, according to the American College of Medical Genetics and Genomics, when genetic testing reveals information that the patient wasn’t looking for—like a gene for a disease other than the one being tested for, or

maybe that their paternity was different from what they thought.

“You have to be ready to handle that as part of informed consent,” says Arthur L. Caplan, head of the Division of Bioethics at New York University Langone Medical Center. If the test might reveal something unexpected, he suggests the test provider explain, “We may find out certain things that you may or may not want to know, so you have to tell us how you want us to handle these things as we find them.”

Incidental findings are rare but can happen, Olszanski acknowledges. Fox Chase is working with its clinical genetics group to come up with a policy on how to reach out to patients if they do find something they weren’t looking for. To a great degree, he says, the patient would have a right to refuse to be informed of unexpected information.

Scratching the surface

So what could the future hold for genetics and cancer treatment? Thanks to genetic testing, Olszanski looks forward to a day when cancers that cannot be cured can be treated as a chronic disease with targeted therapies—that just like patients with diabetes or heart disease, cancer patients will be able to live full lives while taking medications to control their cancer.

“We’re just beginning to scratch the surface,” he says. “I think the future will have us testing more genes and discovering new drugs with the hope of helping more patients with cancer.” ♦

Laura Putre is a Cleveland freelance writer whose work has explored the mysteries of Vitamin B12, genetic research on the Hutterite colony in South Dakota, and using computer modeling to develop tropical disease vaccines. Her work has been published in The Root, Pacific-Standard, and O: The Oprah Magazine.

WHEN GOOD NEW RESEARCH EXPLORES



GENES ACT BADLY

GENETIC 'ON/OFF' SWITCH

BY JENNI LAIDMAN

It turns out our genetic stories don't end with what's written in our genes. The environment and other factors can act on our genes epigenetically, changing how they behave in normal human development—and disease.

There are few options for an elderly person diagnosed with acute myeloid leukemia. Traditional chemotherapy can be as dangerous as the disease itself, and a bone marrow transplant—a common treatment for AML—simply too grueling.

So Patricia Kropf, a Fox Chase physician who specializes in the care of patients with blood malignancies, likes to talk about Ed. The 82-year-old's cancer went into remission when he was treated with an experimental compound that attacks cancer in a unique way. Rather than simply killing all replicating cells—both healthy and cancerous—as chemotherapy is designed to do, the compound sliced away the chemical “tags” on Ed's DNA that had allowed cell division to run amok.

“Not only are we finding that the drug is safe, but it's very effective,” Kropf says.

The clinical trial in which Ed participated is part of a growing area of cancer research at Fox Chase and elsewhere that targets changes occurring not *within* genes, but *on* them. The field, known as epigenetics, deals with chemical modifications that “tag” genes, often in response to

environmental factors, turning them on or off without changing the gene itself. Fox Chase is mounting a joint effort with Temple University Health System to learn why the changes occur and explore the best ways to undo them.

READING GENETIC RECIPES

Jean-Pierre Issa, a pioneer in epigenetic research, helped design the drug trial in which Ed took part. The director of the Fels Institute for Cancer Research and Molecular Biology at TUHS, Issa co-directs the new collaborative cancer epigenetics program.

At one time, the notion of gene mutation seemed to say everything that's important about a cell's tumble into cancer: a typo within a gene led to uncontrolled cell growth. But since the 1990s, a growing number of scientists have noted that in some cancers, the genes behaving badly are, to all appearances, normal, even if their function is not.

Genes are made up of strings of chemicals that, taken together, provide recipes for the many proteins that do the work of the cell. These chemicals, called nucleotides, are represented as A, T, G, and C, for adenine, thymine, guanine and cytosine. If one of the chemicals somehow drops from the recipe, or the chemicals repeat unnecessarily, a mutation results. The ▷



ILLUSTRATIONS: ROB MURRAY/HEATGRAVITY.COM

gene makes the wrong protein or no protein at all. But in epigenetic error, the recipes remain letter perfect. What changes is whether the recipe can be read by the cell's transcription machinery. Tags on the DNA structure can block access to certain genes while opening access to others.

These tags are epigenetic factors. They don't rewrite our genes. They control gene expression by attaching to chromatin—the packaging of DNA and proteins within our chromosomes. Chromatin is responsible for the tidy arrangement of genes. If you've ever packed a suitcase for a long trip and then tried to find your socks in a hurry, you will appreciate the genius of chromatin structure. It allows 6 feet of DNA to cram into a cell nucleus about the size of a grain of



Epigenetic research pioneer Jean-Pierre Issa, director of the Fels Institute for Cancer Research and Molecular Biology at Temple University Health System, co-directs a new cancer epigenetics program in collaboration with Fox Chase.

talcum powder. Our 23 pairs of chromosomes wrap around protein spools called histones in packaging so cunning that protein messengers can locate their genetic socks at a moment's notice. Histones can bind chromosomes snugly, hiding genes from the cell's reading machinery, or they can loosen at critical points to expose genes for transcription.

This is where epigenetic factors act. For instance, a methyl group—a carbon atom ringed by hydrogen atoms—attaches to the chromatin and prevents gene function. Or methyl groups and other chemical markers monkey with the histone complexes, hiding some genes from the reading machinery and exposing others. A growing number of researchers are recognizing the importance of this activity in cancer.

A NEW UNDERSTANDING

The field of epigenetics has exploded in recent years. In 1992, about 1,000 papers tackling epigenetics appeared in scientific journals. By 2011, that number had increased more than eightfold.

Issa has long been a leader in the pack of researchers pursuing epigenetic answers. As of 2008, the most recent year for which data is available, his papers were among the top 10 most cited by other scientists in the field, according to Thomson Reuters ScienceWatch, an online compilation of research data. For publication volume alone, he is among the top five authors in epigenetics. His lab has uncovered several potential new epigenetic cancer drugs, and he has worked extensively with the compound currently in clinical trial, with which Ed met so much success.

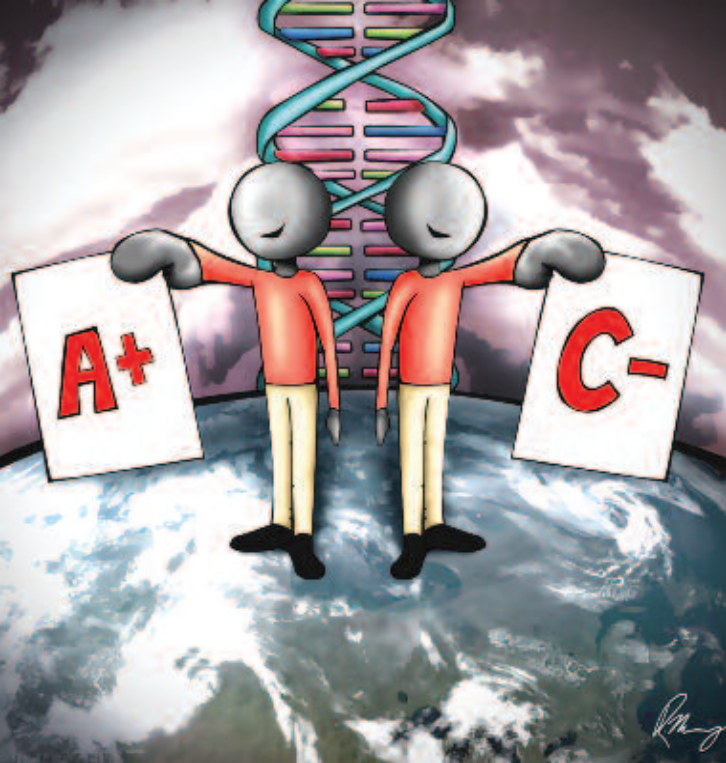
A field that was once a backwater now has widespread acceptance. There is little dispute that epigenetic factors and gene mutations each lead to cancer, as well as interact in the genesis of disease.

"We've been pushing this concept for two decades now," Issa says. "People are seeing a flood of data showing how epigenetics are abnormal in cancer, and almost everyone talks about the genetics *and* epigenetics of cancer, which is very rewarding."

"The field of epigenetics has become progressively more prominent and important, both in basic biology and cancer biology," says Vasily Studitsky, who for two decades has conducted basic epigenetics research. In July, Studitsky joined Fox Chase and became co-director of the Fox Chase-TUHS epigenetics collaboration. He came to the Center from the University of Medicine and Dentistry of New Jersey, Robert Wood Johnson School of Medicine, where he focused on the fundamental question of how epigenetic factors function.

Epigenetic changes are part of a cell's normal development. In the embryo, methylation—the attachment of a cluster of methyl atoms to DNA—tells some genes to pipe down as stem cells develop into their adult forms. Epigenetic changes silence the X chromosome from one parent or the other, at random, in every cell of a female mammal. Epigenetic change is responsible for the differences between genetically identical twins and the differences in the intellectual capacity of genetically similar humans and chimps.

Stressors, toxins, food shortages, and food abundances—many of the elements of our environment—may leave a mark in the epigenome. In that sense, the epigenome is the soil upon which the environment leaves its footprints. Unlike the genome, which is relatively static over a lifetime, the epigenome is dynamic, Issa says, and it drifts as we age. "The



Epigenetic change is responsible for the differences between genetically identical twins.

epigenome of a 10-year-old child is very different from that of an 80-year-old man,” he says. “There is a fundamental age-related drift that will happen no matter what, but the rate of the drift is influenced by environmental factors.”

Anything that drives cell division, such as inflammation, can lead to epigenetic error due simply to the increased probability of mistakes with repetition, he says. “Now there’s an interest in diet, in plastics, in the food your mother ate during her pregnancy. All of these factors feed into the rate of aging-related changes.”

In 2010, Issa found that high levels of the B-vitamin folate in the blood correlated with increased methylation of a gene that can lead to colon cancer.

Epigenetic changes that occur in response to one’s environment can be heritable, staying in place each time a cell divides. That means the epigenetic changes that occur in one’s lifetime may be handed down to one’s children. Carcinogens you encountered before you had kids can change the behavior of the genes you give them and the genes they give their children.

POTENTIAL TARGETS

One advantage of epigenetic targeted treatments lies in the very nature of epigenetic change. Unlike gene mutations, epigenetic changes are reversible. “The epigenetic process is a kind of a layering on genetic information,” says Richard Katz, a Fox Chase researcher. Undoing the additional layer of tags on chromatin can cause deleterious changes to vanish. For example, Katz says, epigenetic drugs can reverse the silencing of tumor suppressor genes.

Katz’s laboratory is working to identify the factors that contribute to epigenetic gene silencing. He has developed

an experimental screening system that allows him to look, gene by gene, for the network of enzymes and proteins involved in epigenetic changes. If a factor that plays a role in gene silencing is removed, his system can tell. The silenced genes are engineered to produce a glow when they turn on.

In this fashion, he was able to identify an entire network of factors involved in silencing via DNA methylation, histone regulation, and other novel mechanisms. Each of these factors is a potential target for cancer treatment.

Collaboration will likely be a key to moving forward with the work. Katz, who meets regularly with Temple epigenetics researchers, says, “I’m excited about collaborating, and I take every opportunity to go down that path.”

Studitsky says the Fox Chase-TUHS partnership is sure to suggest new directions for investigation. “It will open up a lot of opportunities,” he predicts. “I see a lot of potential there.”

Elizabeth Plimack, a Fox Chase physician who specializes in genitourinary cancers, says such collaboration is critical for her patients. “To have all of us in the same room at the same time to share ideas, from my perspective as a clinician...It’s how I learn about the science that’s in the lab,” she says. Plimack hopes to conduct clinical trials using epigenetic agents against solid tumors. The four epigenetic drugs on the market are approved by the FDA only for use in hematologic malignancies.

“We are looking for scientific synergy to make the program as a whole better than its components,” Issa says. “Our goal is to develop a world-class research program, to play on the strengths of Fox Chase and the strengths of individual investigators. By bringing people together, we can move much more quickly.” ♦



UNCHARTED TERRITORY

An Interview with Richard Fisher, President and CEO By Karin Beuerlein



TOMMY LEONARDI

Hematologic oncologist **Richard I. Fisher** is leading Fox Chase Cancer Center during a time of unprecedented transition as it becomes part of Temple University Health System. Fisher, who joined the Center in March as physician-in-chief and interim cancer center director, was named president and CEO in July. Here's his take on what lies ahead.

What drew you to accept a job at Fox Chase?

Fox Chase has a great history as one of the original comprehensive cancer centers designated by the National Cancer Institute. I held an oncology fellowship at the NCI when that program was set up in 1974, and I worked for former Fox Chase president Bob Young in my first full faculty position. So I've been familiar with Fox Chase's mission for years, and I've always valued the success it's had. Then I had the opportunity to come here when I was recruited for the physician-in-chief position, which has transitioned into the presidency.

Did you have any concerns about the fact that this was a time of significant transition for Fox Chase?

No—I think change is an opportunity to have a major impact. The merger with Temple has opened up alternatives for us that we didn't have before.

When you arrived, did you have an immediate vision for what you wanted to accomplish?

Probably not immediate, but the more I got involved, the more the strategic plan came into focus: It's critical to rebuild some of our clinical and research operations, particularly involving medical oncology, where we've had a number of departures recently. We also need to

improve the interaction between our scientific and clinical programs—this is what's known as a “translational” program, or the process by which you move findings from the laboratory into the clinic and apply them to patients to see if the desired results are achieved. Those are the two top priorities, in addition to accomplishing the integration with Temple.

Are there big differences in culture between Fox Chase and Temple?

They do have two very different cultures. Fox Chase's focus has been cancer research and clinical care, serving a specific population. Temple, on the other hand, is a full health care delivery system, especially for underserved populations. They have had far less emphasis on cancer and cancer research than Fox Chase, although they've been moving in that direction in recent years. A comprehensive cancer center can bring a different level of focus to the cancer problem than a university health system that has to serve other interests, so joining with Fox Chase gives them added strength in that area.

How often do mergers like this happen? Is there a template to follow?

This is uncharted territory. We are the first freestanding NCI-designated cancer center to merge with a major health care system, so all eyes are on us as we figure this out and develop new paradigms. ▶

continued from page 19

There are about 10 other freestanding NCI-accredited cancer centers in the country, and I suspect that all but a couple will end up following in our footsteps and joining a health care delivery system.

The challenge is to maintain the advantages of a freestanding cancer center—namely, the ability to focus on cancer and excel at it—while opening ourselves up to the benefits that a health system provides, such as access to a breadth of clinical and scientific research and larger patient populations. For example, Temple has sophisticated systems for reaching predominantly underserved communities, and we can tap into that ability and integrate a cancer focus into those systems. That’s the

“The challenge is to maintain the advantages of a freestanding cancer center—namely, the ability to focus on cancer and excel at it—while opening yourself up to the benefits that a health system provides.”

task in front of us, and the result will be new and relatively unique in the world of cancer care.

What does this transition mean for the Philadelphia community?

The merger with Temple helps to ensure that this great organization will continue to thrive and to serve the needs of the

Philadelphia metropolitan area and beyond. Now, we’re in a position to grow our clinical and research programs even more and serve the needs of a much broader population.

What do you think is the biggest challenge facing you in the coming year?

The biggest challenge will likely be fiscal, because there will be less money flowing into our operations from the National Institutes of Health and the National Cancer Institute, which are the primary sources of revenue for our research programs. Both of those budgets have already been cut in the 2013 federal budget sequester and will shrink even more as Congress attempts to balance the federal budget. That will put stress on all of our operations as we move forward to deliver the kind of patient care and research that are needed.

But the merger itself is a strategy that directly addresses that problem. These days, you can’t survive in isolation. Our merger with Temple provides the broad access to patient populations and breadth of research programs that we need.

What major strength of Fox Chase will you capitalize on as you move forward?

Fox Chase is not only a Philadelphia brand—it’s a national and international name. We want not just to hold our rightful position in the hierarchy of major programs that are attempting to cure cancer, but to build even greater recognition and perception of our value throughout the world. ♦

The Man Behind the Wheel

With so much attention being given to his new administrative duties, observers might well forget that Richard Fisher is first and foremost a nationally known hematologic oncologist. A graduate of Harvard Medical School, Fisher has authored important research in his area of specialty, malignant lymphomas, and significantly influenced the standard of care for patients suffering from that group of cancers. He came to Fox Chase from the University of Rochester Medical Center, where he served as the vice president for strategic and program development and was the Samuel E. Durand Professor of Medicine.

Fisher admits that with all the responsibilities of his new leadership post, the main thing he makes room for outside of work these days is his family. He’s been married for 35 years to statistician and epidemiologist Susan G. Fisher, who is helping advance efforts in clinical and translational research as chairwoman of the department of clinical studies at Temple University School of Medicine. They have three children and three grandsons, plus an Irish setter and a golden retriever to round out the family.

That’s not to say Fisher doesn’t harbor a private passion or two. His colleagues might be surprised to learn that he’s a graduate of Skip Barber Racing School, where a number of NASCAR and Indy 500 drivers got their training. Fisher, who trained at the Blackhawk Farms Raceway outside Chicago, managed to find time to take up that challenge while he was director of the Cardinal Bernardin Cancer Center at Loyola University. “I’ve always been a car guy,” he says, “and I had the chance to really learn how to drive. It’s all physics! It was great fun—and a great conversation piece.”

Fox Chase is happy to have him in the driver’s seat.



Many Tumors Targeted by Existing Compounds

In future, doctors may sequence tumors to pick best treatment

Nearly two-thirds of solid tumors carry at least one mutation that may be targeted, or medicated, by an existing compound, according to a recent study by Fox Chase scientists. The results suggest that it may one day become commonplace for doctors to genetically sequence tumors before picking a treatment regimen.

“Extended sequencing of a patient’s tumor is not something that’s routinely done now,” says hematologist/oncologist Patrick Boland. “Our ultimate hope is that, if we determine testing is worthwhile, it becomes routine for a doctor to send off a tumor sample to look for mutations before deciding on a course of treatment.”

In some forms of cancer, such as lung cancer, doctors do check for a limited number of mutations. At Fox Chase, for instance, the Cancer Genome Institute is screening biopsies for mutations that may be targeted by drugs already on the market, or under development, to help tailor treatment to each

individual tumor. (See story on page 8.) But as of now, the screening available to most cancer patients identifies only a small proportion of such mutations.

During the recent study, 77 patients with solid tumors, primarily inflammatory breast cancer and colon cancer, underwent genetic profiling looking for nearly 200 mutations associated with cancer. Most of the patients—96 percent—carried one or more mutations. Nearly two-thirds had at least one mutation the researchers termed “actionable,” meaning it is targeted by a drug that is on the market or in development. Many of the mutations were amplifications, in which multiple copies of a single gene are present, which ramps up the effect on the body.

Boland, who presented the findings in June at the annual meeting of the American Society of Clinical Oncology, stresses that even though these genetic alterations are



present, in many cases it’s not clear which ones—if any—are driving the cancers. “Even if we find a genetic change, we don’t know if it’s something that’s driving the tumor to grow, or something that just happened along the way,” Boland says. The study highlights the need for more research to understand the basic biology of tumors, he notes: “We need our colleagues in the basic sciences to continue investigating the genetic underpinnings of cancer so we can determine which mutations are most important to target.”

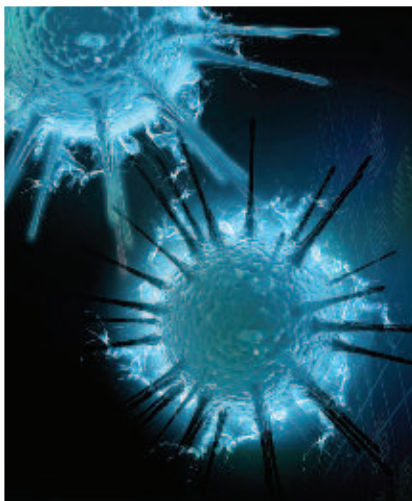
Some Lung Cancers Linked to Common Virus

A common virus known to cause cervical and head and neck cancers may also spark some cases of lung cancer.

Examining tissue samples from lung cancer patients, Fox Chase researchers found that nearly 6 percent showed signs they may have been driven by a strain of human papillomavirus, or HPV, known to cause cancer.

If HPV indeed plays a role in lung cancer in some patients, the next step is to better understand those tumors so they can be treated more effectively. “The ultimate goal,” says medical oncologist Raneeh Mehra, “is to determine if we can target our therapies to the specific characteristics of these tumors.”

During the study, Mehra and her colleagues examined tissue samples from people diagnosed with non-small cell lung cancer who had never smoked. Four of 36 samples had signs of infection from two strains of HPV known to cause cancer, HPV 16 and 18. Look-



Even though many people have been exposed to HPV, it’s likely only a minority that develops cancer as a result.

ing more closely at the two samples infected by HPV 16, Mehra and her team saw signs the virus had integrated into the tumor’s DNA—which is even more suggestive that the infection caused the tumor. They presented their findings in April at the annual meeting of the American Association for Cancer Research.

It’s not clear how HPV reaches the lung, Mehra says; patients may simply breathe it in. Although most people are exposed to HPV, these results are largely not cause for concern, she says. “In my practice, I treat many people with head and neck cancers who are infected with HPV. Some fear that they are ‘contagious’ and could somehow pass the cancer onto their families,” she says. “Mostly, I reassure them—even though many people have been exposed to HPV, it’s likely only a minority that develops cancer as a result.”

New Drug May Prevent Head and Neck Cancers

Researchers at Fox Chase have discovered that a compound naturally present in food inhibits the precancerous lesions that can lead to one of the deadliest cancers—squamous cell carcinoma of the head and neck.

The compound holds real promise for halting the disease at its earliest stages when it is most treatable, says Fox Chase molecular biologist Ekaterina G. Shatalova. “The difficulty in treating head and neck cancer is that the majority of patients are diagnosed at advanced stages. This is one of the reasons why the five-

“The difficulty in treating head and neck cancer is that the majority of patients are diagnosed at advanced stages.”

year survival rate for head and neck cancer is only 40 to 50 percent,” says Shatalova, who presented the findings at the American Association for Cancer Research annual meeting in April. “The earlier we can treat these patients, the better.”

Called homoeriodictyol, or HED, the compound is a dietary flavonoid—a substance that occurs as pigment in fruit and flowers—that is frequently found in citrus fruits. It inhibits the proliferation and movement of precancerous cells from oral lesions known as leukoplakias, white patches that can sometimes, after decades, progress to cancer. HED also inhibits

cytochrome P450 1B1, or CYP1B1, an enzyme that metabolizes tobacco smoke and ethanol—known risk factors for head and neck cancer—to potentially carcinogenic compounds. The researchers have previously shown that deletion of the CYP1B1 gene leads to decreased proliferation and movement of leukoplakia cells taken from the mouths of patients.

“Because HED is considered by the Food and Drug Administration to be a safe food additive, it is likely to be nontoxic to humans and represent a promising agent for routine use,” Shatalova says. The next step, she adds, is to determine if the compound can stop the growth of tumors in animals.

Technique Eases Painful Bone Metastases

A high dose of targeted ultrasound appears to quickly bring patients relief from the pain of bone metastases, and with largely tolerable side effects, according to recent Fox Chase research.

During the procedure, known as high intensity focused ultrasound, or HIFU, doctors direct a concentrated beam of energy to nerve endings that are causing pain in bone metastases. The patients typically have a significant amount of discomfort—half of study participants rated their pain at least a 7 out of

10—but within a handful of days, most said they felt significant relief. The therapy is paired with magnetic resonance imaging to aim the ultrasound beams.

Although Fox Chase patients received local anesthesia during the procedure, the most commonly reported side effect was pain—which can often be alleviated with additional anesthesia, says radiation oncologist Joshua Meyer, who reported the findings in June at the annual meeting of the American Society of Clinical Oncology. “That’s tempo-

rary pain, which is gone as soon as the procedure is over,” he says. “The whole reason we’re doing the procedure is for the pain relief that comes afterwards. And that’s relatively quick—we see a response by a day or so, and within three days of the procedure most patients are reporting a significant improvement.”

Fox Chase is one of just a handful of facilities around the country offering MRI-guided HIFU, which has been approved by the U.S. Food and Drug Administration.

Common Prescription Drugs Prevent, Treat Colon Cancer

Two drugs commonly prescribed for non-cancerous conditions appear to be effective in stopping and slowing the spread of benign tumors in mice that can turn into colorectal cancer.

During the study, researchers at Fox Chase exposed mice bred to develop the benign tumors—known as adenomas—to sulindac, a non-steroidal anti-inflammatory, and atorvastatin (known by the trade name Lipitor®), a cholesterol-lowering drug.

In mice that had tumors prior to treatment, only a combination of both drugs reduced the number of adenomas in the colon by the end of the treatment period. But the results were

strikingly different in mice that were tumor-free when treatment began. In those animals, exposure to atorvastatin alone or in combination with sulindac resulted in about a three-fold increase in the percentage of mice that were tumor-free by the end of the treatment period. Among that group, 44 percent of those treated with atorvastatin alone and 30 percent of those treated with both drugs did not develop tumors, compared with 13 percent of mice that received no treatment and 9 percent that received sulindac alone. Moreover, atorvastatin treatment completely inhibited the formation of microscopic adenomas in the mice.

The findings, presented in April at the American Association for Cancer Research annual meeting, demonstrate that the effectiveness of the two drugs depends on whether tumors are present prior to the onset of treatment.

“Based on this study, we’re able to say that if you don’t have a tumor to begin with, maybe Lipitor is best, but if you do have a tumor to begin with, you need the combination therapy,” says chemoprevention researcher Wen-Chi Chang. “We can start to tailor clinical care based upon the disease state as well as the establishment of tumors.”

Protein Balance Key in Preventing Cancer

Two proteins that scientists once thought carried out the same functions are actually antagonists of each other, and keeping them in balance is key to preventing diseases such as cancer, a Fox Chase study shows. The results suggest that new compounds could fight cancer by targeting the pathways responsible for maintaining the proper balance between the proteins.

"It's our job now to understand how we can intervene therapeutically in this system, so we can restore balance when it's thrown off," says immunologist David L. Wiest.



The two proteins—Rpl22 and Rpl22-like1—contribute to the process by which additional cellular proteins are made. During the study, published in *Developmental Cell* on February 25, Wiest and his team knocked out Rpl22 in zebrafish—a common model of human disease. Without the protein, the zebrafish don't develop a type of blood cell called T-cells that help fight infections. The same developmental defect was observed when the researchers knocked out Rpl22-like1.

But when the team tried to restore T-cells in zebrafish that lacked Rpl22 by adding back Rpl22-like1, it didn't work. The reverse was also

true—Rpl22 was not enough to restore function after the researchers eliminated Rpl22-like1. Those results led the scientists to believe that, although both the proteins are involved in producing the stem cells that give rise to T cells, they do not perform the same function.

To learn more about the proteins' individual functions, the researchers looked at the levels of different proteins involved in stem cell production when either Rpl22 or Rpl22-like1 was absent. Without Rpl22-like1, cells had lower levels of a protein known as Smad1—a critical driver of stem cell development. And when Rpl22 disappeared, levels of Smad1 increased dramatically.

"I like to think of Rpl22 as a brake, and Rpl22-like1 as a gas pedal—in order to drive stem cell production, both have to be employed properly," Wiest says. "If one or the other is too high, it upsets the balance of forces that regulate stem cell production, with potentially deadly effects." Specifically, too much Rpl22 (the "brake"), and stem cell production shuts off, decreasing the number of blood cells and leading to problems such as anemia. Too much Rpl22-like1 (the "gas pedal"), on the other hand, can create an overproduction of stem cells, leading to leukemia.

Even Early Breast Cancer Shows Wide Variability

Individual breast tumors, even in their earliest stages, exhibit significant variations in their levels of key proteins, suggesting that a multiple-target approach to diagnosis and therapy may be needed to fight breast cancer from the very start.

Although experts may often suspect patients carry such variability, determining if that is in fact the case "is a challenge," says Fox Chase geneticist Xiaowei Chen, because pathologists typically cannot evaluate innumerable lesions from each patient. Researchers, too, usually receive only one sample from each tumor they study, making it difficult for them to understand the tumor's complex biology.

During the study, Chen's team evaluated multiple samples from the tumors of 38 patients diagnosed with both ductal carcinoma in situ—

the most common, earliest-stage noninvasive breast cancer—and invasive ductal carcinoma. In most cases, samples from individual tumors exhibited variability in the levels of at least two out of six key proteins. To Chen, the results account for why tamoxifen, for example—which targets only one of the proteins he measured—may not be sufficient for some patients. "Treating a cancer with one drug can shrink the tumor," Chen says, "but after a couple of months, it may come back" because another subtype of cancer cells, already present, takes over.

Chen admits examining every lesion from every patient is not practical. But the results, presented at the American Association for Cancer Research annual meeting in April, let clinicians and researchers know to expect more variety than they may initially observe.

Study Links Dietary Cholesterol, Cell Division

Experts have long known that a healthy diet holds many benefits, including a reduction of cancer risk, and new evidence from Fox Chase may help to explain why: A diet high in cholesterol triggers stem cells—a crucial subset of cells that can give rise to many different cell types—to divide rapidly.

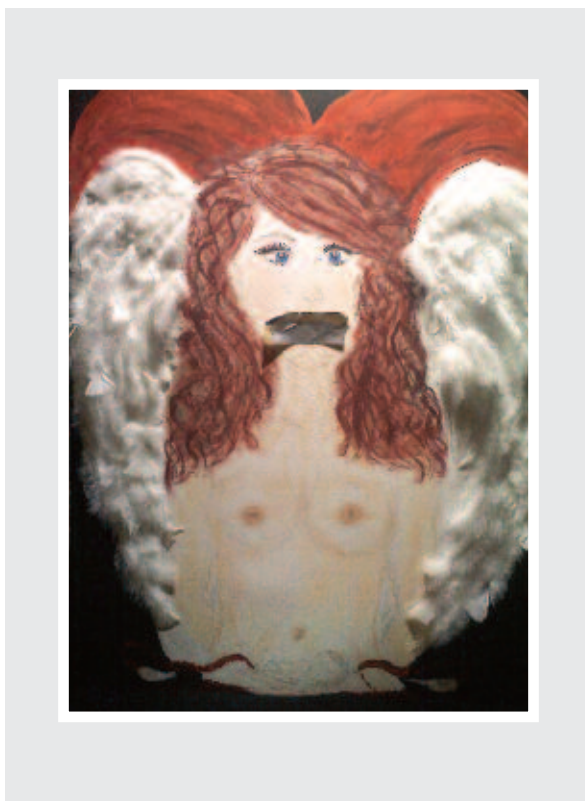
"What we have found is that if you have lots of cholesterol, that makes stem cells divide and divide and divide, more than they are supposed to," says developmental biologist Alana M. O'Reilly. "If you have high levels of cholesterol, you may be initiating a signal that makes your cells divide too much." The next step, she says, is to determine whether this burst of growth has any relationship to cancer, which results from an over-proliferation of cells.

O'Reilly and her team discovered the link between cholesterol and cell division in the fruitfly, a common model of human disease—specifically, a mutant fly whose stem cells divided continuously. Looking more closely, they saw that the fly was missing a protein that puts the brakes on Hedgehog, a protein that drives many cancers, including those in the brain, prostate, and pancreas. Turning to normal flies, they found that when the flies ate low-calorie diets, Hedgehog becomes blocked; adding back dietary elements such as sugar, protein, and cholesterol one by one, they found that cholesterol was the key element—with it, Hedgehog became free to drive the division of stem cells, potentially setting the stage for cancer.

The researchers published their results in the May 20 issue of *Journal of Cell Biology*. Now, O'Reilly says, researchers will look at whether patients with pancreatic cancer who engage in behaviors that raise cholesterol—eat poorly, smoke, don't keep their diabetes under control—are more likely to respond poorly to chemotherapy, then determine if signaling by Hedgehog can explain that pattern.

ARTISTIC EXPRESSION can provide a unique means of understanding, communicating, and even healing from the experience of illness. *Forward* thanks the many contributors who generously shared their work for "Channels," a forum intended to honor and showcase visual and written art inspired by experiences with cancer.

► **TO SEE ADDITIONAL SELECTIONS OR SUBMIT WORK to be considered for future issues, visit Forward online at forward.foxchase.org.**



A SURVIVOR'S SILENT SADNESS

BY TIFFANY MANNINO, *Warminster, Pennsylvania*

This self-portrait memorializes the artist's loss of the ability to have children due to her battle with stage 3 breast cancer. 'I am so grateful to be alive and well, but my survival came at a high price. I feel like I can't talk about my sadness, so I suffer in silence.'

Autumn Moment

BY ARLENE BERNSTEIN, *The Villages, Florida*

As I walk in early autumn
under blazing ancient sun
nascent coolness spreading round me

ripe trees yearning toward their shadows
form a darkly clasping armspace
into which embrace I enter
gladly to surrender body spirit heart in one

and I feel young *and* old *and* ageless
centered focused and serene in this October moment
4:15 P.M. October sixth two thousand four A.D.

Cool wind shifts scenes subtly and abruptly
and *lo* I'm back with you that winter day
at hospice hour
where we've arrived
to help you die
cajole release
woo comfort
seducing Death's surcease
for you
whose cells had run amok
who'd landed past all rescue teams

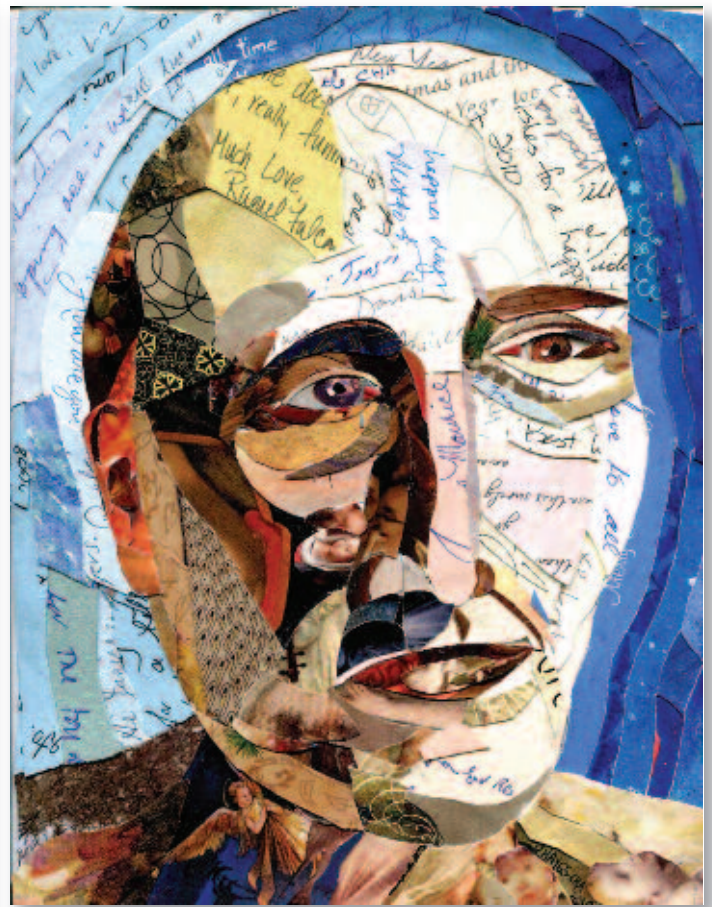
all hope gone

and most unkindest cut of all
love inadequate to right the wrong

How hard to walk this way
To find oneself
forever of two minds
living two lives
in two worlds
in two seasons
in two times
torn by contrarities

missing you
not missing cancer-sorrow

rejoicing in my autumn lushness
watching winter's harsh finality take center stage



SELF-PORTRAIT, HEALTH, 2010; SELF-PORTRAIT, CHEMO, 2010

BY JANICE HAYES-CHA, *Elkins Park, Pennsylvania*

These works are examples of the mixed-media collages that Hayes-Cha creates from get-well cards and other materials, a technique she devised while recovering from cancer. The self-portraits helped launch her new career as an artist in the Philadelphia area. More of her work can be found at www.janicehayescha.com.

Deconstructing the Right Breast

BY JENNY BURKHOLDER, *Philadelphia, Pennsylvania*

(ALL ITALICS FROM "REPORT OF OPERATION BURKHOLDER, JENNY 05/07/12")

*The patient was taken to the operating room
reliving 10th grade,
how they chased warm gin with milk.*

*Following induction of general anesthesia, I marked
out a circumareolar incision on the right breast
like a treasure map
to perform the mastectomy and axillary dissection
through the area.*

*Both breasts, arms, axilla, and abdomen
beautiful, pink, exposed
were prepped and draped in a sterile
white papery fashion*

*We infiltrated, black construction paper sky, pinpricked
to let stars shine through the right breast
with local anesthetic, a double shot*

*for tumbling down
a flight of dark stairs. A #15 blade
was used to make a skin incision.
Decision. Collision. Admission. Glisten. Forgiven.
Flaps were raised
like Buddhist prayer flags, their sadhana of non-attachment
superiorly, medially, inferiorly, and laterally,
all with electrocautery.
Superiorly to the clavicle, those lovely hollows
medially shining to the sun to the sternum,
inferiorly to the rectus abdominis, two canals of muscle
laterally a bridge to be crossed to the latissimus.
The breast was taken off
In its place: thrumming, an embroidery
of sunflowers, thistle, mist.*

THE TIES THAT BIND —REDEFINED

By Nancy Ross-Flanigan

Family—always important to Frank Serianni, wife Heather and son Butch—took on new meaning after Frank was diagnosed with stage 3 Hodgkin's lymphoma in 2009 at age 44. Over the next four years of treatments, recurrences, complications and wholesale changes in their lives, the Seriannis came to see each other in a different light and to think of members of Frank's medical team at Fox Chase as family, as well.

Take the day Frank received a breathless call from physician's assistant Linda Perry. After three years of treatments that included a transplant of bone marrow harvested from Frank's own body, Frank needed a second transplant, this time from a donor. The tissue types of patient and donor must match. Otherwise, the patient's body may reject the transplant or the transplanted cells may attack the patient's body. Frank's family members had been tested, and the Seriannis were awaiting the results. As Perry excitedly told Frank that his brother Eddie was a perfect match, Frank could hear the nurses in the bone marrow unit whooping with elation in the background.

"They were so happy for me," he recalls. "I got off the phone and said, 'That was like my four sisters calling me.'"

The transplant itself was a test of family ties. Frank and his brother weren't on good terms at the time, and Frank knew Eddie had a fear of doctors and needles. "It was really hard for me to go down to his house and break the news," Frank says. "When he opened the door, I started to cry

and said, 'I'm really sorry; you're a perfect match.'" His brother assured him it was all right. In fact, the transplant reopened communication between the brothers and now, Frank says, "We're back to the way we used to be when we were younger."

"We've gone through this horrible trauma... but we're still here, and we're together and looking forward."

The cancer experience changed the Serianni family in other ways. Before the illness, Frank ran the tile installation business he'd worked at since his teen years and taken over in his late twenties after his father died. But cancer and its repercussions made the once-hulking Serianni too weak to heft a single box of tile or clamber up and down stairs like he once had, so he gave up the only line of work he'd ever known, and Heather, who'd previously worked only "for fun," became the breadwinner.

The transition was difficult, but it helped that the Seriannis had shared responsibilities throughout their marriage. "Our marriage was always a partnership, regardless of what our roles were," Heather says. "So even though there was that adjustment, it was just a matter of reallocating our responsibilities; the partnership was still there. It was also a matter

of making a choice not to live in the negative but to live in gratitude. ... Yes, we've gone through this horrible trauma, and it's been emotional and financial and all these things have been so impacted. But we're still here, and we're together and looking forward."

As their roles shifted, Frank admired more than ever the intelligence with which Heather pursued her career goals, and Heather came to appreciate the fact that Frank's strength went beyond the physical. "The things that he has had to psychologically endure, I don't know if I could," she says. "I really admire him for that."

Both parents rallied to help son Butch, 18, cope with seeing his father change from a powerhouse who was always in motion—building and fixing things, planning what to do next—to someone who could hardly muster the energy to take 10 steps. Even the family dogs Stella and Violet did their part, keeping Butch company when Frank and Heather spent long hours at the hospital and sitting with Frank when he didn't feel well.

Now that Frank is feeling much, much better and shows no signs of cancer, the family is moving into a new phase: finding ways to offer support and hope to other patients at Fox Chase. A first step was participating in the Center's Paws for the Cause fundraising dog walk in October, where Butch played drums with two bands that entertained the crowd.

"It was the first time in a long time that I'd been to Fox Chase for something that wasn't a treatment or a test," Frank says, "and it was great." ♦





A FOUNDER'S DREAM FULFILLED

ANNA JEANES WANTED TO CREATE A COMPREHENSIVE CARE CENTER DEDICATED TO CANCER AND OTHER LONG-TERM ILLNESSES. MORE THAN 100 YEARS AFTER HER DEATH, FOX CHASE IS HELPING REALIZE THAT VISION.

By Alison McCook

In 1947, a hospital created by Quaker philanthropist Anna Jeanes sold some of its land to the institute that would one day become Fox Chase Cancer Center. Now, more than 65 years later, Jeanes's vision of a cutting-edge facility dedicated to compassionate care for cancer and other long-term diseases is coming to full fruition as Fox Chase and Jeanes Hospital reunite under Temple University Health System.

Anna Thomas Jeanes was born April 7, 1822 in Philadelphia. Her family was devoutly Quaker and gained its fortune

primarily through its ownership of coal-rich lands. None of her siblings had children, so as the youngest, Anna inherited the entire family's wealth.

Anna Jeanes was a small woman—less than 100 pounds—with little formal education, but she had a strong passion: to help those less fortunate. Working with Booker T. Washington and others, she dedicated more than \$1 million to support rural schools.

She also drew up her own will (reportedly in her own handwriting) and included an endowment to create a hospital for “cancerous, nervous, and

disabling ailments” that would operate under the aegis of the Quaker faith, in which each patient would be treated compassionately, as a whole person. Upon her death in 1907, she left her remaining estate in the hands of the Philadelphia Yearly Meeting of Friends, which was charged with managing her family farm in the northeast Philadelphia neighborhood of Fox Chase, along with the to-be-created hospital.

After searching Philadelphia and neighboring regions for the best site for the hospital, the trustees ended up right back where they'd started: the Jeanes

Anna Jeanes created an endowment to establish a hospital for “cancerous, nervous, and disabling ailments.”

family farm. Jeanes Hospital—still located on that site—opened January 25, 1928. By then, the Jeanes endowment was worth \$3.5 million.

Soon, however, the hospital began struggling to fulfill Anna’s wishes. After World War II, the surrounding community grew, as did its medical needs. In 1946, Jeanes Hospital doubled its number of beds and switched its focus from cancer and other long-term illnesses to general medicine and surgery. But Anna Jeanes’s will was very specific. So in 1946, Philip Sharples, a member of the board of trustees at Jeanes Hospital and the first president of the Institute for Cancer Research—which would one day become the research arm of Fox Chase Cancer Center—proposed a solution: build a new facility dedicated to cancer research on Jeanes Hospital land. “He was the link that connected Jeanes Hospital to the ICR,” says Robert LeFever, chairman of the board of Jeanes Hospital and president of the Anna T. Jeanes Foundation.

Soon after, in exchange for \$8,800, the hospital gave 10 acres to the ICR with the following stipulation: “That the said premises shall at all times hereafter be used for the conduct of research for the prevention and cure of cancer, and nervous and disabling ailments.” The land was technically a sale, but an unusual one, says LeFever: “The ICR had to follow certain conditions, and if not, the land would be taken away.” It was a mutually beneficial relationship, he adds, in that “bringing the ICR onto the campus enabled Jeanes Hospital to become more of a general hospital and move away from the direct stipulation in Anna’s will.”

When the ICR needed to merge with

a cancer hospital to become eligible for new federal funding in the 1970s, it joined forces with the American Oncologic Hospital, which had recently set up shop nearby. When the hospital moved onto the property, it paid the Jeanes trustees



Facing page: An aerial view of Jeanes Hospital in 1928, the year it opened, shows some of the land that Fox Chase would eventually occupy. **Above,** Philip T. Sharples holds the first shovelful of dirt at the 1947 groundbreaking for the Institute for Cancer Research, which became the research arm of Fox Chase. Sharples, a trustee of Jeanes hospital and the first president of the institute, is joined by institute founder Stanley Reimann.

\$40,000—under the same condition that the new facility be dedicated to long-term ailments, such as cancer.

The merger of the American Oncologic Hospital and Institute for Cancer Research into Fox Chase Cancer Center in 1974 enabled Jeanes Hospital to become a truly general hospital. It remains the

nation’s only Quaker-founded acute care hospital—the board of directors makes its decisions by consensus, not vote, and the facility places a particular importance on creating a nurturing environment for patients. “All hospitals should be loving, caring environments, and Jeanes has been able to stay that way,” says LeFever, who previously served on the hospital’s board of directors from 1979 to 2000, the last few years of which he served as board chairman. In 1996, as many other hospitals began consolidating, and to boost its ability to negotiate with insurance providers, Jeanes Hospital joined Temple University Health System.

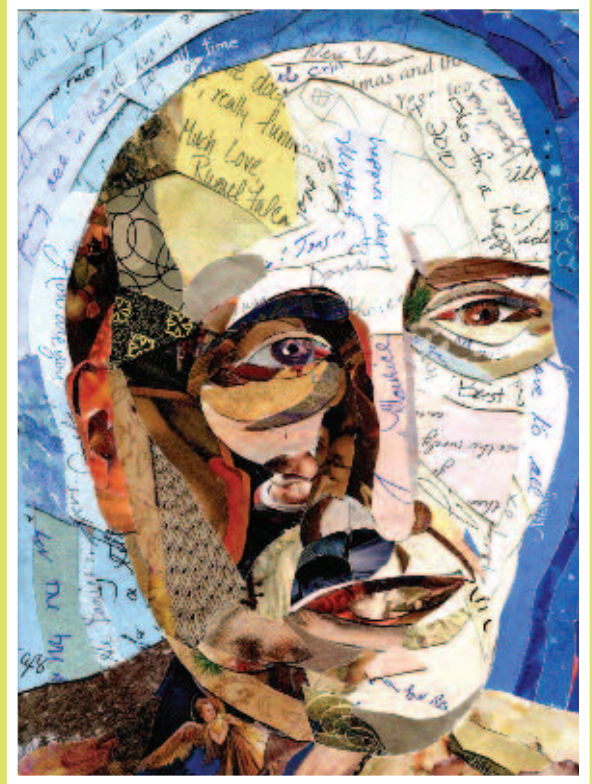
Although Jeanes Hospital was forced to veer from Anna Jeanes’s original intent, she would likely be pleased with how its relationships with Fox Chase and TUHS have played out, LeFever says. Today, the very land she once lived on is home to cutting-edge research and treatment facilities dedicated to the ongoing and whole-body needs of people with cancer and other debilitating illnesses, at Fox Chase and Jeanes Hospital. “At first, she would have been disappointed to see Jeanes Hospital become a general hospital,” he says. “But if she had watched how the hospital carefully recognized the changing needs of the community, then collaborated with the ICR and Fox Chase to maintain her focus on cancer, she would have understood—and probably applauded—the evolution of things.” Seeing each piece of this healthcare puzzle reunite as part of the TUHS family would have made her proud, he adds. “This is coming full circle.” ♦

333 Cottman Ave.

Philadelphia, PA 19111-2497

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“SELF-PORTRAIT, CHEMO, 2010,”

is among the collages created by Janice Hayes-Cha of Elkins Park, Pennsylvania, while recovering from cancer. Hayes-Cha constructed the work from get-well cards and other materials.

For more creative expressions of experiences with cancer, see “Channels” on pages 24-25.