

P A T H W A Y S



Change: the key to cancer—and cancer care

Cancer is defined in part by its ability to evolve. The principal route by which normal cells become cancerous is through mutation, changes to the cell's DNA that affect key genes. All of our body's cells can incur mutations as they divide, but most are harmless. Cancers arise when cells mutate in a way that allows them to reproduce more prolifically than other cells; metastasize, or spread; and avoid the body's natural defenses.

Those who have experienced a cancer diagnosis—their own or that of a loved one—know the disease also demands change of those it affects. Plans and routines are suddenly replaced by new priorities: going to the doctor, absorbing information, dealing with the effects of the illness and its treatment. Patients may find themselves contemplating, perhaps for the first time, their own mortality. Some talk of finding a “new normal”; others emerge from the experience profoundly transformed.

Like its patients, Fox Chase also is changing. The hospital that would become the Center's clinical enterprise, which began operating in 1905 in a converted Victorian home in West Philadelphia, saw 206 patients in its first year. In 2010, the Center provided state-of-the-art care to more than 33,000 individuals at our newly expanded facilities. What remains constant is Fox Chase's pioneering leadership in cancer care and research.

In 1959, a Fox Chase graduate student discovered the first evidence of a genetic cause of cancer—the anomaly that became known as the Philadelphia chromosome. Today, people with chronic myelogenous leukemia—a disease once considered incurable—can live full and active lives, thanks to a treatment based on that discovery. Fox Chase is now poised to take the next giant step in transformative cancer genetics with the launch of an unprecedented genome-sequencing effort that will further our understanding of the genetic basis of cancer and use that information to customize individual treatments.

We will tap the combined talents of geneticists, molecular biologists, genetic counselors, clinical researchers, and physicians—as well as partnering with our patients and supporters—as we enter this next chapter in cancer science and medicine. Together, we will advance, each day, toward our goal of prevailing over cancer.

Sincerely,



Michael V. Seiden, M.D., Ph.D.
President and Chief Executive Officer



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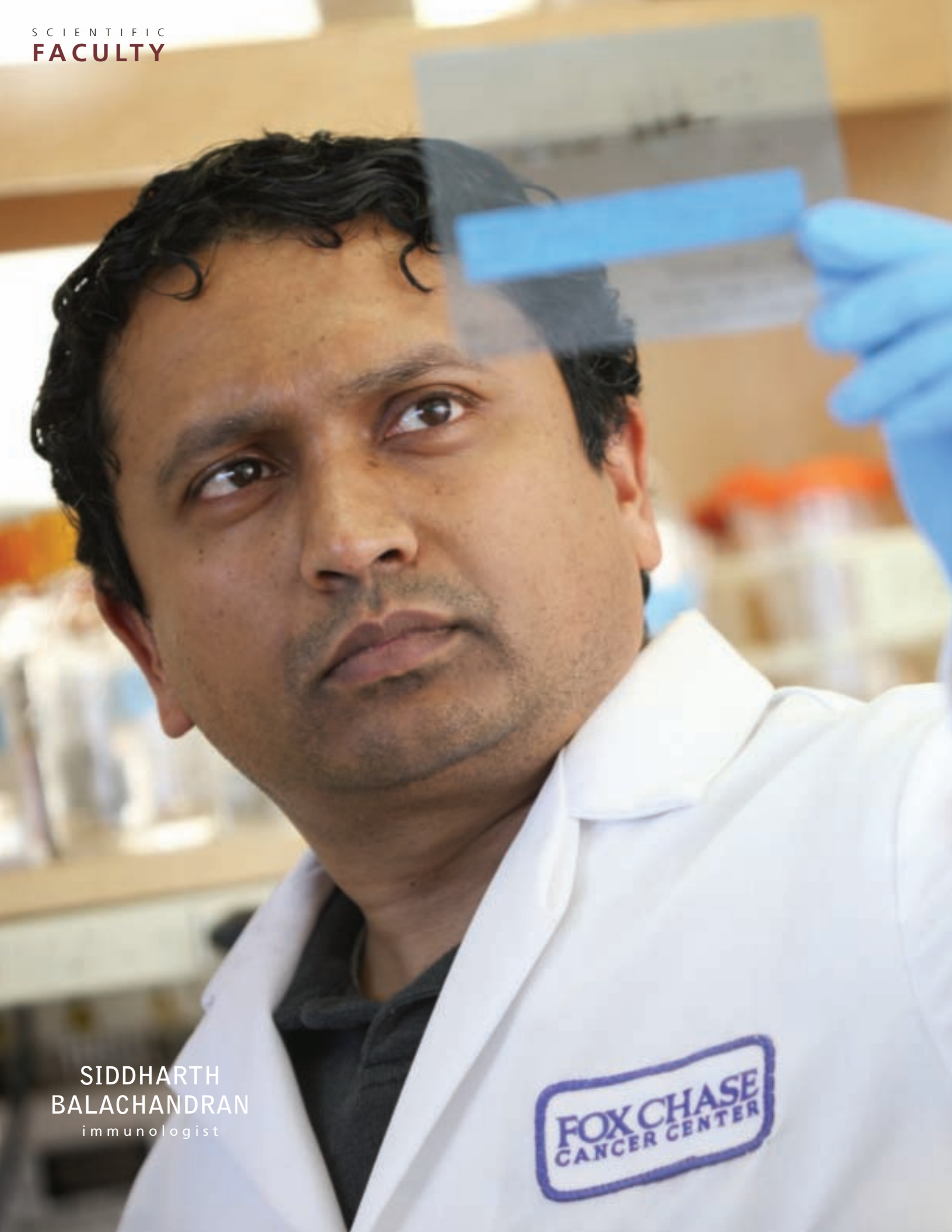
AT THE CENTER of the Fox Chase campus is a grassy, tree-filled courtyard. During nice weather, patients and their families gather there on sun-warmed benches to breathe the fresh air.

The brick walkways that crisscross the courtyard and connect the Center's surrounding facilities reflect a phenomenon at the core of the Fox Chase experience: People come to the Center from all over the world and all walks of life—some as patients, some as staff members. Each comes for a reason. Each has a story.

Their paths to Fox Chase include heartbreak, perseverance, and hope. There's Zeng-Jie Yang, the former pediatric brain surgeon who became a scientist to find better treatments for children with brain tumors. And Barbara Cremean, the mother who had to face telling her children she had cancer—and now has survived the disease twice. And the trio of brothers who do everything together: running a business, facing cancer, and supporting Fox Chase.

For a period of time—whether it's days, months, or years—the lives of these individuals intersect at Fox Chase Cancer Center. These are the stories of what brought them here, what Fox Chase has given them, and what they have given back.





SIDDHARTH
BALACHANDRAN
immunologist

FOX CHASE
CANCER CENTER

Target: Smarter Treatments

The cells were dead. Again. The experiment ruined. Again. Although it didn't help him at the moment, Siddharth Balachandran knew he was onto something.

Now a researcher studying immune cell development at Fox Chase, Balachandran was a graduate student at Emory University when he stumbled onto the ability of interferon, a protein produced by the immune system, to kill certain cancer cells at very low doses if they lacked a key gene. At the time, he needed those cells alive, so he tucked the result away.

Balachandran, who considers biological research "a creative endeavor," says he is driven by curiosity and the pull of discovery. That curiosity brought him to Fox Chase three years ago to pursue the insight he gained from his tainted experiment. Today, he's designing a Phase 1 clinical trial that uses his interferon discovery as the basis of a treatment for renal cell carcinoma, the most common kidney cancer in adults.

The young scientist wants to design treatments that precisely target cancer cells. Traditionally, cancer medicine has taken a bash-it-with-a-wrench approach. Most chemotherapy drugs kill all dividing cells, and interferon, although approved in 1986 to treat certain cancers, isn't effective unless administered in doses that make patients miserably ill. But Balachandran's find may transform interferon from blunt instrument to jeweler's

tool when it comes to treating kidney cancer.

The cells Balachandran worked on as a student lacked a gene that makes the protein FADD. Their death suggested that FADD is involved in cells' resistance to interferon; its absence apparently left them vulnerable. Through his research at Fox Chase, Balachandran has pinpointed how FADD blocks necroptosis, a form of cell death. Making interferon more effective against cancer might be as simple as turning off proteins, such as FADD, that block its killer instincts.

Last year, his laboratory also discovered another protein that helps cells survive an interferon attack: Nuclear Factor Kappa B. The finding made sense: Many cancers have high levels of active NF-Kappa B, which apparently makes interferon impotent.

In laboratory experiments, Balachandran found that a drug called Velcade™, combined with interferon, killed cancer cells from patients with renal cell carcinoma. Because the two therapies already are approved by the Food and Drug Administration, he can move his discovery directly into a Phase 1 clinical trial with patients with metastatic kidney disease that is resistant to other treatments.

While the path of his research has included a certain amount of luck, Balachandran says, "that is just the way biology works. A biologist's job is to walk through this bejeweled cave and discover things simply by opening doors that others haven't. It's a process of discovery."

A WORLDWIDE LEADER

Clinical trials of new kidney cancer therapies are just one aspect of Fox Chase's worldwide leadership in the treatment of kidney cancer. The Center also specializes in surgery that preserves the unaffected portion of the kidney and maintains its function, often using minimally invasive methods such as robot-assisted surgery. "Our team is among the most experienced in the country in performing complex, kidney-sparing surgery," notes surgeon Robert G. Uzzo.

The Keystone Program in Personalized Kidney Cancer Therapy, established in 2008, aims to maximize innovation in the treatment of kidney cancers by bringing together the Center's clinical and scientific expertise. Among the program's objectives is improving early diagnosis of the disease.

Quality Matters: Beyond Survival

Miriam Lango absolutely, positively would not be a doctor. That's what she told her father, the orthopedic surgeon, and her mother, an oral surgeon and dentist, and that's what she believed.

Today, she is a head and neck surgeon at Fox Chase and doesn't for a moment regret her decision to continue the family tradition.

Ever since she was a little girl, Lango saw herself as an artist, musician, or writer. By the time she was finishing college, a career in academia seemed certain. As she studied literary theory, her adviser told her, "You were born to do this."

But when it came time to choose, she says, "I could not imagine myself holed up in a room every day, writing. I loved the thinking part, but I needed to be connected with people. I knew I was going to love surgery; I was always good with my hands. And this work combines the different parts of my personality; it's technically and intellectually challenging."

The challenges of her field put the critical thinking skills she once applied to literature to work determining the best treatments not only to eliminate a patient's cancer, but also to produce the fewest long-term side effects.

In the past, for example, throat cancer surgeries often cost patients

their ability to speak. The advent of minimally invasive surgery—Lango's specialty—coupled with the increased use of radiation and chemotherapy to treat such cancers, has improved patient survival and eliminated the need for most surgical incisions. Today, surgeons like Lango can insert a flexible laser through the mouth and around the voice box to reach even the smallest tumor.

"It is such an exciting time to be doing what I'm doing," Lango says. "The field has changed so much." Most recently, she has begun using robot-assisted surgery for some cases, sitting at a console and using mechanical arms to control a surgical laser.

But while such advances have minimized many side effects, the treatments for head and neck cancer still can affect functions such as the ability to swallow.

That's why Lango wants to find the best ways to evaluate the after-effects of treatment, such as by measuring patients' swallowing ability with questionnaires and imaging technology. She is leading such a study, which she hopes will help to identify effective therapies that cause the least collateral damage.

"I want to find a way to measure outcomes like quality of life," she says. "I want to see that the patient is actually doing better—not just surviving, but surviving with the best possible quality of life."

• HANGING UP • ON HEAD AND • NECK CANCER

- Growing cancer cells send chemical signals more distinct than any personalized ringtone.
- The Center's Keystone Program in Head and Neck Cancer seeks ways to interrupt those signals with biological tools such as targeted antibodies.
- Focusing on cancers of the mouth, throat, voice box, and sinuses, the program aims to develop therapies that will help more patients survive—with fewer side effects.
- Basic scientists, clinical researchers, and physicians work together to explore cancer's complex biology, learn how to disable the cell's ability to resist treatment, and help to ensure a better life for patients.



MIRIAM
LANGO
surgeon

Physicians Named 'Top Docs'

Thirty Fox Chase physicians representing a range of specialties were highlighted in *Philadelphia* magazine's annual "Top Doctors" issue, published in May. The list is designed to serve as a guide to expert medical care in the Philadelphia region.

Featured doctors were selected through a national survey of professional peers, with nominees screened by physician-led research teams based on criteria

such as education and experience. One in four of the Center's physicians were included.

Select physicians also appeared in the section "Physicians, Healing Themselves," which detailed their health and fitness habits. Among them was chief of head and neck surgery John A. Ridge, who competes internationally in fencing. "A fitness regimen should be sustainable," he noted. "That means it should be fun."

Symposium Marks Anniversary of Seminal Discovery

Noted oncologists from around the globe gathered in Philadelphia in September for "The Philadelphia Chromosome Symposium: Past, Present and Future." Hosted by Fox Chase, the symposium marked the 50th anniversary of the discovery of the first genetic abnormality associated with cancer, which also led to the first targeted therapy.

In 1959, David A. Hungerford, a graduate student at Fox Chase, and Peter C. Nowell, a pathologist at the University of

Pennsylvania, detected an abnormality on chromosome 22 in cells from patients with chronic myeloid leukemia. The abnormality became known as the Philadelphia chromosome. Today, many CML patients live for years on imatinib (marketed as Gleevec™), a drug that targets the cancer-causing protein produced by the abnormal chromosome.

Addressing symposium attendees, Fox Chase CML patient Ryan Corbi said, "Because of the work that you and your peers are doing, I am able to live not just a somewhat normal life . . . I am able to live a full and healthy life."

For more on the Philadelphia chromosome, visit pubweb.fccc.edu/philadelphiachromosome.



PATIENT:
GILBERTO ROLÓN

**MUSIC
MAN
KEEPS
ROLLIN'**



Some people commemorate cancer survival with a fabulous vacation. Others go out and buy that sports car or motorcycle they've dreamed of for years.

Gilberto Rolón cut a couple of CDs.

What else would you expect of a man who, for most of his 75 years, has turned to music to enhance the good times and endure the bad?

Growing up in rural Puerto Rico, Rolón didn't have it easy, but after migrating to the United States in the early 1950s he found an assembly-line job that put food on the table—and weekend music gigs that nourished his spirit.

In addition to being one of Philadelphia's first Hispanic disc jockeys, the singer-songwriter performed in clubs and on local television and recorded two

albums of romantic tunes that his son Gilbert Jr. describes as "Hispanic country music with a Frank Sinatra flair."

Years later, music helped Rolón cope with the discovery of colon cancer that had spread to his lung. Though he'd been having worrisome symptoms for a year, Rolón had put off having his first colonoscopy until he turned 70—a full 20 years beyond the recommended age. The first doctors he consulted wanted to remove his entire colon, but at Fox Chase, where he sought a second opinion, surgeon Elin R. Sigurdson was able to remove the tumor and rebuild the colon to preserve its function, with no need for a colostomy bag.

"My father is a proud man who's lived in the limelight for a lot of his life, so that was important to him," Gilbert Jr.

says. "He's so thankful that he came to Fox Chase."

The surgery, along with chemotherapy to control growth of the cancer in Rolón's lung, has allowed him to continue enjoying life and making music. In recent years, he has recorded two new CDs, one with a mariachi band.

Six years after his diagnosis, Rolón is still sharing his music at family get-togethers, and in the midst of the festivities he makes a point of sharing something else: the story of his cancer experience and the importance of screening and prevention. And he never fails to sing the praises of his Fox Chase medical team.

"The doctors and nurses are wonderful," Rolón says. "They've become extended family to me."



ALLA
LAPIDUS

genomic specialist

A Behind-the-scenes Revolutionary

Alla Lapidus doesn't meet with patients. She doesn't select their treatments or stand at their bedsides. Yet she is a crucial part of a revolution in cancer care, one that will enable doctors to tailor therapies to individual patients. The result will be more effective treatment and, she hopes, longer lives.

Lapidus came to Fox Chase in August to set up systems to rapidly analyze patients' genomic data as part of the Institute for Personalized Medicine. The data help shed light on the genetic mutations that cause cancer so researchers can develop new treatments and match patients with the best therapies. She also is putting together the analytical team that will keep the Center up-to-the moment in a world where technology can change with the click of a mouse.

The third-generation scientist is an expert in the complexities of genome sequence assembly and analysis. Because sequencing machines cannot read whole genomes at once, they break them into short pieces. From her computer, Lapidus realigns and merges the fragments, reconstructing the entire original sequence. Her challenge: to identify any potentially cancer-causing abnormalities among the three billion bits of genetic information in the human genome.

Her previous professional interests lay far from Fox Chase. Before coming to the

Center, Lapidus worked at the Joint Genome Institute, a U.S. Department of Energy laboratory in California. There, she assembled the genomes of fungi and bacteria and helped to create bioinformatics tools that made her work ever quicker and more accurate. It was a job she enjoyed, in which her contributions were many. But when Fox Chase came calling, she felt a personal connection to the Center's mission.

Eight years ago, her husband Michael Mazur, a laser physicist, died of salivary gland cancer. For Lapidus, the experience was a nightmare. When her husband was diagnosed, doctors said the cancer was extremely rare but the prognosis good: The tumor would likely progress very slowly. Mazur could live for 10 to 15 years. But the projection was based on averages; they could offer little

more. Mazur's cancer proved ferociously aggressive, something the doctors said was "not just rare, but fantastically rare." He died just a year and a half later.

After that, the notion of contributing to cancer research and treatment resonated with Lapidus. "When I realized there was a chance to help others, I started to think I could be one of the people to make that happen," she says. "Right now, in many cases, treatment is based on population studies, on averages. But individuals are not average. With the amount of data the scientific community is collecting, it's time to start treating people as individuals."

"It's time to start treating people as individuals."

PROFILING CANCER

No two tumors—even from the same organ—are truly alike. Every cancer, and every tumor, has a unique genetic profile. Each of the roughly 22,000 genes in the human genome is subject to mutation or altered levels of expression, and identifying which changes lead to cancer, and which are most amenable to therapy, is the key to successful treatment.

Fox Chase's personalized medicine initiative aims to use the latest gene sequencing technology to identify the genetic profiles of the various cancers and match patients with the best treatments for their individual tumors.



**MICHAEL J.
HALL**
genetics specialist

Conversations that Save

Sometimes interacting with a single patient can open the door to helping an entire family. Michael J. Hall, who specializes in assessing patients' risk of gastrointestinal cancer, wants to make sure he can walk through that door.

After joining the Center in 2008, Hall developed a screening clinic for people at potentially high risk of gastrointestinal cancer based on their family history. A multi-disciplinary team including a genetics counselor reviews the patient's family background, recommends genetic testing if appropriate, and suggests methods of cancer prevention.

Hall knows that how he relays information to a patient can mean the difference between detecting cancer early in an at-risk family and missing an opportunity. His goal is to "empower people with information to take back to their family and their community."

He invests himself in his work. What he values most, he says, are the relationships he develops with his patients. "Often when people have a hereditary cancer, it's an early-onset cancer," he notes. "And many of those individuals are younger than I am. It's always a little sobering."

Hall's own family has experienced many cancer deaths, including aunts

and uncles lost to smoking-related cancers. "It's one reason I'm interested in prevention issues," he says.

Information alone isn't always enough, and a person who knows she's at high risk for cancer won't necessarily take preventive measures. For instance, certain genetic mutations associated with breast cancer also put women at increased risk of ovarian cancer. Removing the ovaries reduces that risk to near zero, yet women who know they carry such mutations do not routinely have their ovaries removed. Hall understands the complexity of such decisions. "People have other influences in their lives," he says. "Having your ovaries removed is not something you just casually have done."

Turning information into action is one of his challenges. "To communicate genetic risk, I have to do just as much listening as talking," he says, "to get a handle on what the patient understands. I'm not only trying to inform them, but to prepare them to be a voice of communication to the rest of the family." His goal: that at the next family reunion or holiday party, his patient shares information about genetic risk and prevention with her family members—a gift that could save lives.

A PIONEER IN PREVENTION

A leader in cancer risk assessment and prevention, Fox Chase was one of the first institutions in the nation to offer screening, education, and counseling to healthy people at increased genetic risk of disease.

The Center's Risk Assessment Program, which celebrates its 20th anniversary in 2011, evaluates patients for factors that may put them at increased risk of cancers—including breast, ovarian, uterine, gastrointestinal (including colon), prostate, and thyroid, as well as melanoma—and recommends appropriate follow-up measures.



Thanks to prime-time television, people might think they know what cops are like: a hard-boiled bunch who rarely crack a smile, squirm when talk turns to sensitive subjects, and would rather take a jolt from a Taser than admit to shedding a tear.

Meet Peter Hagerty, a real-life South Jersey police officer who shatters a few stereotypes. Hagerty, 38, credits humor—along with his wife Eryn and his Fox Chase medical team—with helping him get through surgery, chemotherapy, and more surgery for Stage II testicular cancer that had spread to lymph nodes behind the major organs in his abdomen. What's more, he owns up to some emotional moments along the way, and he's got no problem these days talking about his experience.

Hagerty did play the stoic at first when, in 2009, he noticed groin pain as he got in and out of his patrol car. He chalked it up to rough-housing with his toddler son Cole and didn't give it much thought for a couple of weeks. After all, except for the occasional cold, he wasn't the kind of guy who got sick.

But when his testicle turned rock-hard, he realized "something's not right" and didn't balk when Eryn urged him to see a doctor. The diagnosis was a bombshell to the young husband and father.

"I wondered if I'd see my son grow up—or if I'd even see the end of the year," Hagerty says. "I'm not going to say I didn't cry; when nobody was around, I did my 'boo-hoo.' But then it was, 'All right, let's do the game plan; we're going to get through this.' "

The game plan included removal of the testicle at a local hospital, followed at Fox Chase by four cycles of chemotherapy overseen by medical oncologist Elizabeth Plimack and lymph node removal by urologic surgeon Richard Greenberg.

"My experience from day one was great, considering why I was at the hospital," Hagerty says. "Dr. Plimack and Dr. Greenberg were on point with what we were going to do and what to expect during the treatment; the nursing staff was kind and caring and made me feel like a person and not just a head in a bed. It made me want to work harder to kick the cancer."

Now back to work and "back to normal," Hagerty advises his guy friends, from high school buddies to fellow officers: "If you don't feel right, go get it checked."

Fox Chase Ranked Among Top Postdoc Employers

Budding scientists with newly minted doctorates would do well to start their careers at Fox Chase, according to the prominent life sciences magazine *The Scientist*. In its annual survey, the magazine ranked Fox Chase among the top places in the nation for postdoctoral researchers to work.

The Center, which ranked 12th in the country, was the only top-ranked institution in Pennsylvania. The survey covered factors including working conditions, ben-

efits, and family and personal life. Post-docs gave Fox Chase particularly high marks in training, mentoring, and communication.

"I like to think that their positive impressions of Fox Chase as an employer mirror the high value that we, as an organization, place on the contributions of postdocs to our research," says Maureen Murphy, director of postdoctoral training programs. "Simply put, we could not be as competitive without them."

Room to Grow

Facility expands space for research, patient care

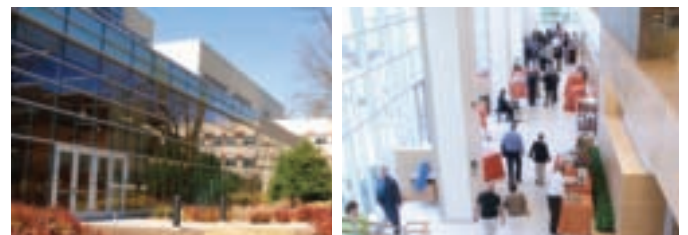
A newly expanded building that supports Fox Chase research and treatment was dedicated in honor of a former Center president in May. The Robert C. Young, M.D., Pavilion houses the Women's Cancer Center, the department of radiation oncology, and the research program in cancer control and prevention. It also will be home to the future Cancer Genome Institute. (See page 22.)

Elected officials including Philadelphia City Councilman Brian O'Neill, U.S. Rep. Allyson Schwartz, and state Rep. Brendan Boyle gathered in the Pavilion's sun-drenched "campus corridor" with Center employees, board members, donors, and

the building's namesake, who served as Fox Chase president for 18 years before stepping down in 2007.

"While this honor is immensely flattering as well as humbling," Young said, "it is not so important what is *on* the building as what takes place *within* it. The unique blend of science and medicine facilitated by the building's design will serve cancer research and our patients well into the future."

The Young pavilion subsumes the 108,000 square feet of the former Prevention Pavilion. With 116,000 square feet of new space, the building is the largest on the Fox Chase campus.



PATIENT:
 PETER HAGERTY

**TO SERVE
 AND
 PROTECT**

The young woman handed a container of medicine to a nurse in the office of gastroenterologist Minhhuyen Nguyen and scurried away without a word.

For Nguyen (*pronounced "Wynn"*), creating a relationship with patients is a critical step in medical care. When the nurse told her about the patient's mysterious behavior, Nguyen called the woman, for whom English was a second and difficult language, and out it came: The hepatitis C medication was making the patient sick. She didn't want to offend her doctor by rejecting the medicine, so she tried to sneak it back in.

By calling her patient and listening, Nguyen believes, she built a bridge to better health for her patient in the long run. "We have to maintain that relationship," she explains. "I needed to tell her, 'Even if you don't want the medication, you should follow up with me so I can keep an eye on your hepatitis, and as new discoveries in medicine and treatment develop, I can discuss them with you.'"

Nguyen's own need to learn a new language when she came to the United States from Vietnam at age 12 sensitized her to people's need to communicate. As a result, she tries to make extra time for patients during

office visits, even when she's on a tight schedule. "I can't just go in and have the visit be all about my agenda," she explains. "The patients may have a different agenda, and they have to have time to talk about it." While she acknowledges the demands of keeping a schedule, she says, "human relations are never about efficiency."

And efficiency is no small matter to the mother of two, who, in addition to treating gastroenterology patients, runs one of the largest hepatitis clinics in the region. Hepatitis B and C are the leading causes of liver cancer, so the Fox Chase clinic focuses on prevention. "What we're trying to do is get rid of the virus, or control it, so patients won't develop advanced liver disease and liver cancer," Nguyen says.

These days, she also watches out for signs of a new source of liver disease and liver cancer called metabolic syndrome. Linked to obesity, diabetes, and high cholesterol, the fatty liver disease can result in cirrhosis—which can turn into cancer.

"Our whole model at Fox Chase is to start with prevention," Nguyen says. "When you cannot prevent, you try to detect early. Then, if someone has cancer, we have a multidisciplinary group that determines the best way to help patients so we can give them the best chance of survival."

"I can't just go in and have the visit be all about my agenda."

GETTING THE MESSAGE ACROSS

- **A patient who is told her tumor is benign—rather than that she doesn't have cancer—may not realize she's hearing good news.**
- **The use of medical jargon, combined with people's reluctance to speak up if they don't understand a term, can create a mismatch with potentially grave consequences.**
- **According to the National Center for Education Statistics, the average American adult reads at an eighth-grade level.**
- **By educating its staff in clear-communication techniques, Fox Chase helps to ensure patients' health literacy: the ability to read, understand, and use health information to make appropriate decisions and follow treatment instructions.**

Taking Time to Listen



**MINHHUYEN
NGUYEN**
gastroenterologist



ZENG-JIE
YANG
cell biologist

The boy was an appealing 5-year-old who wanted to be an astronaut, and he changed the course of Zengjie Yang's life. The child had a particularly aggressive form of brain cancer called medulloblastoma. Yang was still in China then, working as a neurosurgeon. He and his mentor operated on the youngster hoping to, at the very least, extend his life.

Three months after surgery, the child was dead. That's when Yang knew for sure that the limitations of pediatric neurosurgery would always frustrate him. "I felt a kind of helplessness," he says. "A lot of times, when a child had a brain tumor, there was really nothing we could do to help him. It was this boy who made me decide to go back to basic science to learn more about brain tumors."

He left his surgical scrubs behind and turned to the laboratory, asking, How do brain tumors start, how do they grow, and how can they be killed? In November, following postgraduate work at Duke University, he came to Fox Chase to find answers.

Already, he has unearthed clues. Having discovered the stem-cell origins of medulloblastoma, he looks for ways to target the developing cells. He also discovered a previously unknown source of new brain stem cells in the cerebellum, a development he hopes

to exploit to mitigate the side effects of tumor treatment in children.

"Children's brain tumors are more challenging because many brain tissues are still developing," he explains. "If we use radiation to treat the tumors, it causes a lot of side effects." Those effects can include cognitive deficits such as problems with thinking and learning. Yang hopes the neuronal stem cells born in the cerebellum can be directed to damaged areas of the brain, lessening the effects of treatment.

He also is investigating the characteristics of the tumor's neighborhood—the "microenvironment" of cells that

keeps the tumor fed and cared for. Yang hopes to shut off communication between the tumor and its microenvironment, depriving the malignancy of

support and nutrition. Laboratory experiments so far are promising, and he plans to move into animal studies.

Driving him on is the memory of the children for whom he could not do enough. "I keep thinking of those kids, of their faces," he says. But he feels encouraged by the potential of his research: "It makes me think that in the future, I can do something useful."

That perspective is shared by at least two other people: the parents of the boy who didn't get a chance to fly. They have tracked and cheered Yang's progress and its promise of hope for other children.

"I keep thinking of those kids, of their faces."

A KEY TO STEMMING CANCER?

Cancer stem cells have generated a great deal of interest and excitement among researchers over the past decade. They are distinct from the other cells that form tumors in that, like normal stem cells, they can self-perpetuate and produce progenitor cells. The progenitors, then, can repopulate tumor cells eradicated by treatments such as chemotherapy.

It is thought that cancer stem cells cause relapse and metastasis by giving rise to new tumors. While much uncertainty about cancer stem cells remains, the development of therapies that target them holds hope for improving the survival and quality of life for cancer patients.

Surgeon Seeks Answers in Science

Clinic Treats Aggressive Form of Breast Cancer

In May, Fox Chase opened the region's first clinic dedicated to treating patients with a rare and aggressive form of breast cancer. The Inflammatory Breast Cancer Clinic is led by Massimo Cristofanilli, chairman of the department of medical oncology.

"Patients with inflammatory breast cancer often face challenging odds—first to be promptly and accurately diagnosed and then to receive the most effective treatment," Cristofanilli says. "With the opening of this clinic, Fox Chase is dedicating itself to improving both diagnosis

and care for inflammatory breast cancer patients."

Cristofanilli came to Fox Chase in January from the University of Texas M.D. Anderson Cancer Center, where he founded and led the Morgan Welch Inflammatory Breast Cancer Program and Clinic, which at that time treated more cases of the disease than any other facility in the world.

Inflammatory breast cancer accounts for only about 1 percent of breast cancers in the United States and can be difficult to diagnose, as it rarely causes a lump and may not appear on a mammogram.

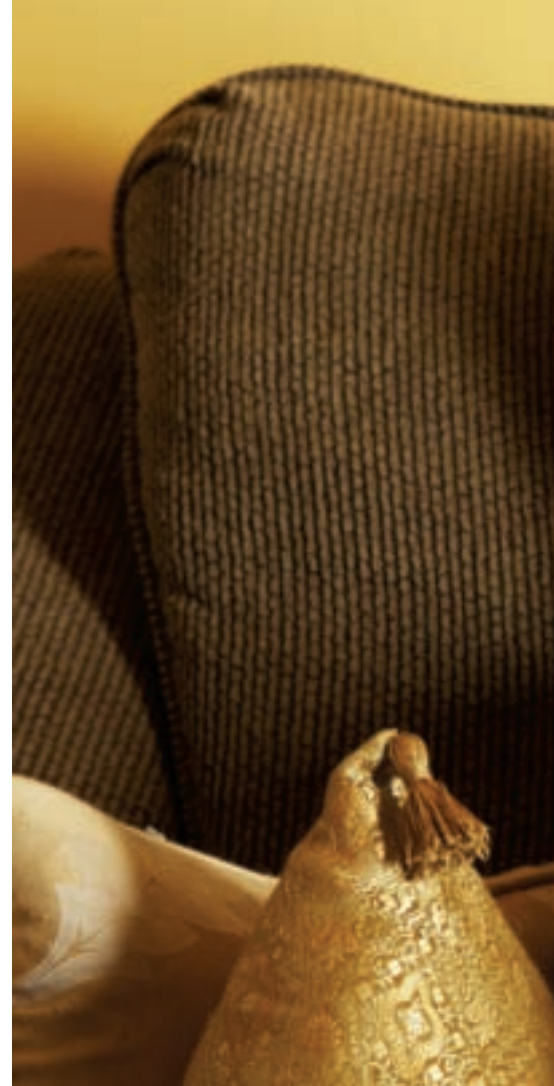
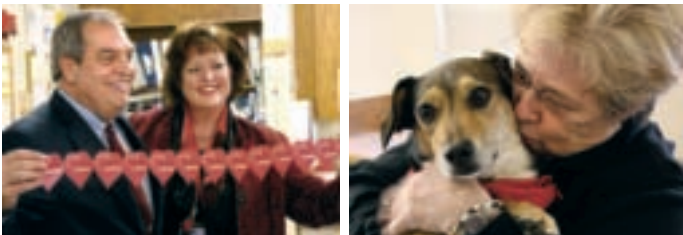
'Love Versus Cancer' Unites Cancer Community

The "Love Versus Cancer" initiative, which Fox Chase launched in February, invites the entire cancer community—from patients and their families to physicians and scientists—to join in recognizing the power of love to unite those touched by the disease.

The initiative kicked off with the release of the three-minute video "Wag." Set to Nat King Cole's recording of the song "L-O-V-E," the video showcases both the compassion of Fox Chase's human caregivers and the cheerful good will of visiting pet therapy dogs.

By year's end, thousands of Love Versus Cancer buttons, wristbands, and T-shirts had been distributed across the country and around the world. Also tied to Love Versus Cancer, the Center saw a nearly fourfold increase in Facebook "fans," fivefold increase in Twitter followers, and exponential leap in YouTube activity as views of "Wag" climbed past 25,000.

Visitors to LoveVersusCancer.org can view "Wag," post their own videos, send e-cards, request Love Versus Cancer gear, and join the online community.



PATIENT:
BARBARA CREMEAN

**TALKING
THROUGH
TROUBLE**



Meeet with a social worker?
Thanks, but no thanks, Barbara Cremean thought when first offered the opportunity more than a decade ago. Not that everything in her life was peachy at the time. Far from it.

Diagnosed with leiomyosarcoma, a rare cancer of the connective tissues, the mother of two young daughters was about to begin a chemotherapy regimen that required spending six days in the hospital every three weeks. She had plenty on her plate without making time to meet with someone and—what, just talk?

“I didn’t want to deal with that,” says Cremean, 49. “Maybe it was also that I had a lot of emotions I didn’t want to deal with.” Before long, though, Cremean realized she did need help coping. “So I gave in and agreed to the meeting, and that was a really good decision.”

In the Fox Chase social work services department, Cremean found a valuable resource for not only handling the physical and emotional aspects of cancer but also managing practical matters like financial and family issues. When she fretted over how to tell her daughters about her cancer, for instance, her social worker offered suggestions and a video to watch with the girls.

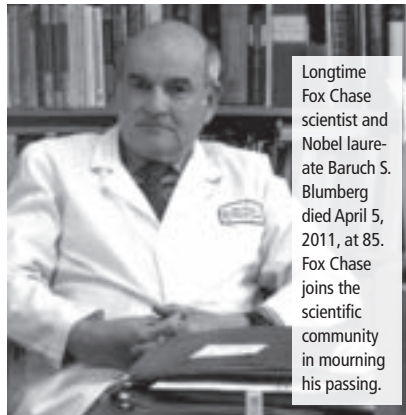
“It was kind of a corny video, to tell you the truth, but it did open the door and start the conversation,” Cremean says. “Without that and my social worker’s advice, I honestly don’t know how I would have handled the situation.”

In the years since her first cancer experience, life has presented Cremean with more challenges: extreme pain, costly medications, a second bout with cancer (this time, of the stomach), unem-

ployment for both her and husband Mike, early menopause, and most recently, a brain cancer scare (thankfully, a false alarm). Through it all, social worker Luanne Chynoweth, who began working with Cremean near the end of her leiomyosarcoma treatment, has offered support and helped her find solutions to what seemed like intractable problems.

“When I was in the hospital with my second cancer, Luanne—along with the doctors from my first cancer, my pain management team, and all the nurses—would pop in to see me,” Cremean says. “Even now, if I come in for an appointment, she’ll sit in on the visit and talk with my doctors with me. When I had the brain cancer scare, she was right there when I got my results. I’m very fortunate to have her.”

REMEMBERING BARUCH S. BLUMBERG



Longtime Fox Chase scientist and Nobel laureate Baruch S. Blumberg died April 5, 2011, at 85. Fox Chase joins the scientific community in mourning his passing.

NOBELIST HONORED ACROSS GLOBE

Baruch S. Blumberg, who won the Nobel Prize in medicine in 1976 for his discovery of the hepatitis B virus, gave talks and received honors around the world in 2010.

- He received a Weinman Foundation Fund for Innovation award from the Cancer Research Center of Hawaii at the University of Hawaii in March.
 - He was elected an honorary member of the Romanian Academy—a cultural forum founded in 1866 and dedicated to science, art, and literature—and traveled to Bucharest in late March to address the group.
 - In Bangladesh, a lecture was named in his honor. The first Blumberg Lecture was held in Dhaka on World Hepatitis Day—May 19, his birthday—at a conference attended by more than 400 physicians.
 - He accepted an honorary doctorate in May from the Open University in the United Kingdom.
 - In September, he received the 37th Annual Award from the Chinese Hospital in San Francisco. Efforts to eradicate hepatitis B from San Francisco have inspired similar movements across the country.
- Blumberg co-invented a vaccine against hepatitis B—a leading cause of liver cancer—that is estimated to have saved millions of lives.

AWARDS

Nurse Recognized for Patient Education

The Oncology Nursing Society selected Kathy Smith, clinical coordinator of the infusion room, to receive the Excellence in Patient/Public Education Award, which she accepted at the society's 35th annual congress in May in San Diego.

Smith was honored for her efforts to educate patients about undergoing chemotherapy. She co-developed and teaches a class on the topic at Fox Chase and developed a video for patients unable to attend.

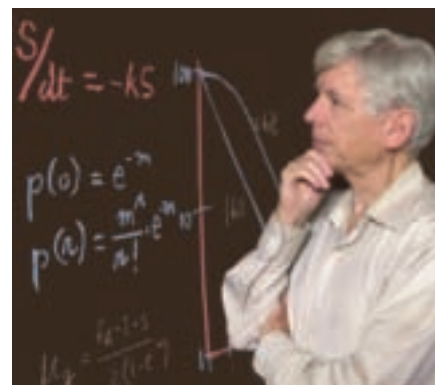
"Patients tended to be anxious when they came to the infusion room for their first treatment because they didn't know what to expect," Smith explains. "We wanted to create an environment where patients and their loved ones could get information about managing the physical and emotional effects of chemotherapy. Our goal is to prepare them by letting them know what to expect and helping them develop a support system."

A 34-year veteran of nursing, Smith is in her 20th year with the Center.

Esteemed Geneticist Receives Lectureship Award

Geneticist and physician Alfred G. Knudson Jr., a member of the Fox Chase research staff since 1976, received the Leopold Koss Lectureship Award from the American Society of Cytopathology in November. Renamed last year to honor Leopold Koss, who is considered a father of clinical cytology—the study of cells—the award has been given annually since 1967 to a scientist who has made outstanding contributions to basic medical research. As the inaugural Leopold Koss lecturer, Knudson spoke about cellular mechanisms in hereditary cancer at the group's annual meeting in Boston.

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 cancerous cell growth. The now-confirmed theory advanced the understanding of the genetic "errors" that turn normal cells into cancer cells.

Oncologist Honored for Work in Prevention

Medical oncologist Paul F. Engstrom, a specialist in gastrointestinal cancers and senior vice president of the Center's extramural research programs, earned the American Society of Preventive Oncology's Distinguished Achievement

Award for his work in cancer prevention and control.

Engstrom accepted the award at the society's annual meeting in March, at which he delivered a talk on the progress made in cancer prevention over the past 40 years.

Employee Lauded for 'Lessening Burden'

The American Cancer Society named transportation and housing coordinator Ellen Herrmann, a Fox Chase employee for 33 years, to receive the Volunteer Achievement Award in October.



Herrmann helped launch and continues to coordinate the Road to Recovery program, through which volunteers transport Fox Chase patients to and from

treatment, using their own cars. In 2009, the program provided 889 rides to 64 patients.

"We wanted to create less of a burden for people who don't have a way of getting here, don't have a family, or don't have a family that can take the time off to get them to and from the hospital," Herrmann says.

Leaders Earn International Honor for Research

Two longtime Fox Chase leaders were honored in October for their contributions to gynecologic oncology. Robert C. Young, who served as Fox Chase president for 18 years, and physician, researcher, and administrator Robert F. Ozols, who retired from Fox Chase in 2009, jointly received the Award for Excellence from the International Gynecologic Cancer Society at the group's biennial meeting in Prague.

The award citation reads, in part: "They were never afraid to challenge dogma and critically appraise treatment results. ... In addition, they are known and respected as excellent clinicians with empathetic, knowledgeable, and thoughtful care of women with gynecologic malignancies."

P R O M O T I O N S

New Chief Scientific Officer Named

Fox Chase appointed molecular oncologist Jonathan Chernoff to be senior vice president and chief scientific officer in August. Chernoff, who has been with the Center since 1991, studies how important cellular enzymes influence the behavior of normal and malignant cells. In his new position, he is responsible for charting the course of research at the Center.

"I am humbled and excited by this opportunity," he says, "and look forward to working with my colleagues to expand our translational research and capitalize on our unparalleled scientific strengths."

Former chief scientific officer Jeff Boyd was named executive director of



the Institute for Personalized Medicine, an initiative he helped to launch, and vice president of molecular medicine.

Deputy Chief Scientific Officers Appointed

Molecular biologist Erica A. Golemis and immunologist David L. Wiest were named deputy chief scientific officers in the fall following the appointment of Jonathan Chernoff as chief scientific officer.

Golemis's research ranges from deciphering basic cell biology to developing treatments for various types of cancer. She serves as co-leader of both the Keystone Program in Head and Neck Cancer

and the Developmental Therapeutics Program, as well as playing an active role in initiatives such as the Fox Chase-Russian Institute affiliation.

Wiest has a distinguished record of achievement in delineating the signals that control T-cell development. He serves as co-leader of both the Immune Cell Development and Host Defense Program and the Keystone Program in Blood Cell Development and Cancer.

Immunologist Named Associate Chief Academic Officer

Viral immunologist Glenn F. Rall assumed the post of associate chief academic officer in December, a role that expands his responsibility for mentoring junior researchers and students and contributing to the Center's academic vitality. Rall co-leads the Immune Cell

Development and Host Defense Program, chairs the Animal Care and Use Committee, and serves on several committees dedicated to the mentorship of junior faculty members, postdoctoral researchers, graduate students, and high school students.

O N T H E

N E W A N D U P C O M I N G

GENOMICS INSTITUTE TO DEVELOP TARGETED THERAPIES

Most cancer patients—whether they have cancer of the breast, colon, prostate, or brain—receive the same standard treatments. Research has shown, however, that no two tumors are alike; each has a unique genetic profile. Fox Chase plans to launch an unprecedented genome-sequencing effort that will help to develop targeted therapies and match them to the genetic makeup of individual tumors.

The Cancer Genome Institute, a collaborative venture of Fox Chase and partners in the biomedical industry, will use newly available technology to rapidly sequence an individual's entire genome, providing potentially invaluable information to guide treatments and further

scientists' understanding of the genetic basis of the various cancers. The initiative, which will build on the foundation of the Center's Institute for Personalized Medicine, is anticipated to be among the largest cancer genome sequencing efforts in the country when fully operational.

"Since the discovery of the Philadelphia chromosome, the first genetic anomaly associated with cancer, Fox Chase has been a leader in personalized medicine," notes molecular geneticist Jeff Boyd, who heads the initiative. "With the combination of bioinformatics and technological advances now available, we plan to take that legacy to the next level."



SNIFFING OUT LUNG CANCER

Scientists have long known about the ability of dogs to detect disease—including cancer—through their keen sense of smell. Fox Chase is partnering on a pilot study of a tool that could "sniff out" lung cancer on the breath of patients, potentially providing a non-invasive method for early detection of the deadliest cancer.

Scientists at the Technion-Israel Institute of Technology in Haifa,



Israel, have developed a tool capable of distinguishing the breath of lung cancer patients from that of healthy individuals.

The test uses gold nanoparticles as sensors; they react to volatile organic compounds in exhaled breath that indicate the presence of lung cancer.

"If this proves effective, it could provide an easy, non-invasive, accurate way to detect lung cancer," says

Fox Chase pulmonologist Michael Unger, who plans to oversee a pilot study of the screening tool this spring at the Center.

In addition to its potential use for early detection, the technology could play a role in monitoring the effectiveness of therapy. Unger notes that, if initial studies prove successful, the test likely would face several years of additional testing before becoming available in the clinic. It also could be used to develop similar tests for other cancers.

H O R I Z O N V E N T U R E S A T F O X C H A S E

FOX CHASE PARTNERS WITH CHINA'S FIRST CANCER CENTER

A budding partnership with a cancer center halfway around the world promises to extend the Center's expertise to a new population.

In December, Fox Chase took initial steps to solidify its partnership with the 307 Hospital of the People's Liberation Army—home of China's first cancer center—when the hospital's president and key staff members traveled to Philadelphia to meet with Fox Chase leaders. The Beijing cancer center treats tens of thousands of patients each year and houses the largest breast cancer and lymphoma departments in the country.

"The 307 Hospital is a leading center for cancer research and treatment in

China," says chief medical officer J. Robert Beck. "We have the opportunity to become the first Western institution to partner with them on clinical research and advanced cancer diagnostics and therapeutics."

The partnership will give clinicians in Beijing access to Fox Chase expertise for diagnoses, second opinions, and treatment planning. Fox Chase also plans to host physician and management training sessions for the Chinese hospital's staff.

In turn, the collaboration will contribute to Fox Chase's expanding international presence and give the Center's physicians and scientists more opportunities to develop relationships with peers from around the world.



ASIAN-AMERICANS make up one of the fastest-growing ethnic groups in the United States. Research shows higher cervical cancer rates, lower rates of cervical cancer screening, and a higher incidence of hepatitis B in certain Asian-American subgroups. Fox Chase is working with the Center for Asian Health at Temple University to identify and address the psychosocial, language, and healthcare system barriers behind those disparities.

BOUTIQUE AIMS TO BOOST SELF-IMAGE

People being treated for cancer sometimes experience changes in their appearance that can add to the weight of their illness. A boutique set to open in the Women's Cancer Center will support the facility's mission of caring for "the whole person" by providing specialized cosmetic products and services.

Offerings will include wigs, hats, and scarves; mastectomy prostheses; skin care services; and massage therapy—all designed to bolster patients' self-image

and ease their stress, says Bonnie Miller, administrative director of the Women's Cancer Center. "Our mission is really to improve the quality of a patient's life," she says. "It's not just about the treatment itself. We want our patients to feel comfortable, and having this boutique will help to ease their burden."

Set to open in fall 2011, "Boo's Boutique" honors the memory of for-



mer patient Louise Binswanger. "Our grandchildren always called her 'Boo,'" says husband John, "and she shared many vital years with them, thanks to Fox Chase. She knew that helping a woman feel good, and feel like herself, is critical to her staying ahead of the disease. She would be proud to see her name on this facility, and I'm grateful to the Friends of the Hospital of Fox Chase Cancer Center for their generous support of this project."

Resisting Drug Resistance

Tactic cuts off cancer's escape routes

Molecularly targeted therapies, which block the action of specific cancer molecules, can reduce tumors rapidly. However, tumors that respond to the treatments often develop resistance as cancer cells find alternate pathways to those blocked by the treatment agent. Hypothesizing that drug combinations that simultaneously target multiple pathways would be more effective for longer periods, Fox Chase researchers have developed a novel method of identifying targets for such combinations.

The investigators focused on the epidermal growth factor receptor, or EGFR.

An important driver of cancer growth, the cell-surface receptor serves as an “on switch” that tells cells to divide.

Employing a novel screening method that combines computational techniques with high-throughput screening, the investigators pinpointed more than 60 proteins that are necessary for cancer cells to survive in the presence of an agent that inhibits EGFR. When they simultaneously blocked both EGFR and individual proteins from this group, more cancer cells died. The study was published in September in *Science Signaling*.

“We found that knocking out one or the other target doesn’t have a major effect, but

knocking out both increases tumor cell death,” notes medical oncologist and scientist Igor Astsaturov.

The researchers say the screening method opens the door to identifying more effective drug combinations. Already, two clinical trials are under way to test innovative therapies based on the new data. Hossein Borghaei, director of the Lung Cancer Risk Assessment Program at Fox Chase, is launching a trial of the EGFR inhibitor erlotinib, combined with a kinase inhibitor, in patients with non-small-cell lung cancer. Astsaturov is testing a drug called vandetanib—which inhibits EGFR and another protein in the EGFR network—in patients with esophageal cancer.

The screening approach uses a principle known as “synthetic lethality.” A cell’s survival depends on proteins that carry out crucial functions. Because multiple proteins contribute to each function, the cell can compensate for the loss of a single protein. However, simultaneously removing a second protein that cooperates closely with the first—thereby creating artificial, or synthetic, conditions—is lethal for the cell.

Geneticists have used synthetic lethal screens in experiments with model organisms such as fruit flies and yeast for decades, but cancer researchers have only recently adopted the approach as a tool for developing better treatments.

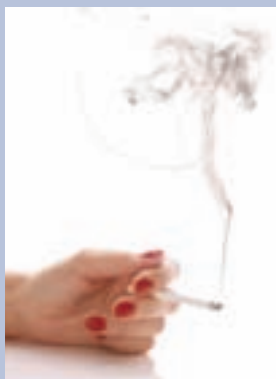
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SMOKING IS A LEADING CAUSE OF CANCER—which is why Fox Chase investigates innovative smoking-cessation treatments such as the use of light therapy to ease nicotine withdrawal. “Many of the problems that light therapy is effective in treating—depression, sleep disturbance, increased appetite, and difficulty concentrating—are the same issues people experience during nicotine withdrawal,” says researcher Amy B. Lavez, who leads the first clinical trial to test the therapy for smoking cessation.

Study Links Smoking with Estrogen

While the rate of lung cancer in men has decreased in recent decades, the rate for women has continued to grow. Research at Fox Chase may provide an explanatory piece of the puzzle.

Examining the effects of tobacco smoke on the lungs of female mice, cell biologist Margie Clapper and colleagues found that the smoke triggered rapid changes in gene expression, including an increase in the expression of genes involved in estrogen metabolism. Ten genes were differentially expressed within the lungs of mice exposed to smoke for three, eight, and 20 weeks, compared to control animals. The gene most affected, called Cyp1b1, activates toxins in tobacco smoke and metabolizes estrogen



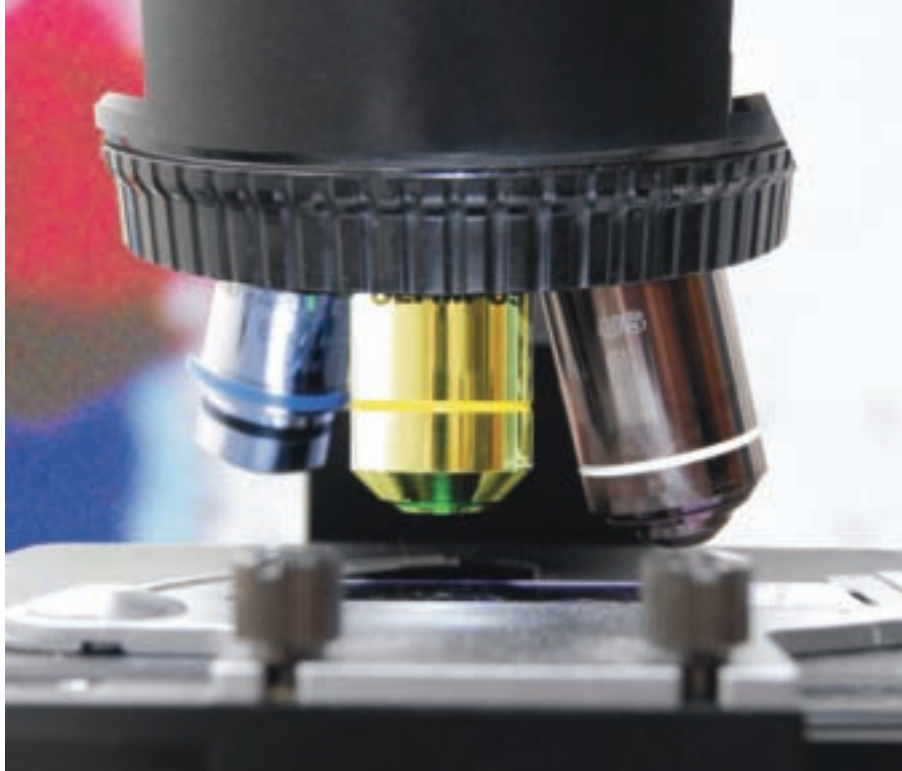
to a form believed to be carcinogenic.

“We found a link among hormones, tobacco smoke, and lung cancer when we weren’t even looking for it, which is very exciting,” says Clapper, who co-leads the Cancer Prevention and Control Program.

“Previous work has suggested that estrogen may play a role in lung cancer, but no one has shown that smoke can actually accelerate the metabolism of estrogen within the lungs.”

The observation that estrogen can be detected within the lungs and that its metabolism is upregulated in the lungs of

smoke-exposed female mice may provide new insight into the rise of lung cancer among women, Clapper says. The findings were published in June in *Cancer Prevention Research*.



Researchers Advance Treatment, Understanding of Ovarian Cancer

Fox Chase faculty members have made major advances in treating and understanding ovarian cancer, a disease that kills nearly 15,000 women in the United States each year.

Robert A. Burger, director of the Women's Cancer Center, led an international Phase III clinical trial that found that adding bevacizumab (known by the trade name Avastin™) to standard frontline chemotherapy for advanced ovarian cancer, then continuing treatment with bevacizumab alone, extends patients' progression-free survival time—the time before the disease returns or worsens—from 10.3 to 14.1 months.

"This is a fairly high-risk population," Burger says, "so a four-month improvement is significant." He presented the results in June at the annual meeting of the American Society of Clinical Oncology.

Bevacizumab interferes with angiogenesis, the process by which new blood vessels form to supply a tumor's growth. Although the drug was known to extend progression-free survival for other cancers, this was the first trial showing it to be effective against advanced ovarian cancer. Patients now have another treatment option to discuss with their doctors, Burger says.

In a separate study, researcher Jeff Boyd, vice president of molecular medicine, and colleagues from Memorial Sloan-Kettering Cancer Center uncovered evidence of how and where ovarian cancer originates.

"We had identified precursor lesions in other cancers, such as cervical, colorectal, and breast," Boyd says. "None of that knowledge has existed for ovarian cancer."

Over six years, the researchers used microscopic and molecular imaging to examine ovarian tissue from three groups: women with tumor-suppressor gene mutations, those with no known genetic risk factors, and others with early-stage ovarian cancers. They found that most ovarian cancers develop inside cysts that form in the epithelium, the tissue that lines the ovary's surface. The researchers also identified dysplasia, or early structural changes, and aneuploidy—having too many chromosomes—as key causal factors within the cell.

The findings, published in April in *PLoS ONE*, will be critical in designing a reliable screening test, Boyd says: "We're at a place now where we can focus our efforts on looking for early lesions and early biomarkers, before cancer develops."

Enzyme May Customize Treatment for Head and Neck Cancer

Patients with advanced head and neck cancer usually are treated with a drug called cisplatin, an inorganic platinum agent that inhibits cell growth. Although many patients do not respond well to the drug, oncologists typically don't prescribe alternatives because they don't know which patients will respond and which won't.

Recent Fox Chase research suggests that patients' levels of ERCC1—an enzyme that helps repair cisplatin-related DNA damage—predict who is likely to respond to platinum therapy. A study found that ERCC1 levels correspond with the likelihood of survival for patients with squamous cell carcinoma, a common type of head and neck cancer that originates in the mucus membranes. The findings might eventually help guide treatment for patients with recurrent and metastatic disease.

"These results open avenues to testing agents that could be more effective in specific patients and cause fewer side effects," says medical oncologist Raneeh Mehra, who presented the findings in April at the meeting of the American Association for Cancer Research.

Mehra and her colleagues studied tissue from tumors of the head and neck from more than 100 patients, comparing those treated with cisplatin and surgery to those treated with surgery alone. They found that low ERCC1 levels were associated with increased survival among those receiving the drug. In patients treated with surgery alone, there was no association between ERCC1 status and survival.

"When we saw there was a survival difference in patients who received the cisplatin treatment based on this biomarker, we were very excited," Mehra says. "These findings support the idea that personalized medicine is possible in treating these cancers."

Scan Could Aid Kidney Cancer Diagnosis, Treatment

A diagnostic scan capable of distinguishing one of the most common and deadly forms of kidney cancer from non-cancerous tumors may soon become available, thanks in part to work by Fox Chase physicians.

Kidney cancer is often diagnosed radiographically, when a CT or MRI scan detects a mass, and up to 70 percent of kidney tumors are detected by scans during evaluation for other ailments. However, such tests cannot distinguish among cancer types, or sometimes between cancerous and noncancerous growths. In the absence of a definitive diagnosis, surgeons often operate to be safe, and patients who undergo surgery may discover that their masses were benign.

Fox Chase led participation in a national, Phase III clinical trial that demonstrated that an antibody called 124I-girentuximab, or G250, combined with PET or CT imaging, can distinguish clear-cell renal cell carcinoma—a form of the most common kidney cancer in adults—from other types of kidney masses. If approved by the Food and Drug Administration, the test would be one of the first disease-specific molecular scans capable not only of identifying a tumor's origin and location but also its cell type, arming physicians and patients with critical information.

Such a test “could have a significant impact on the patient by giving physicians the ability to match tumor biology to the most appropriate treatment,” says Robert G. Uzzo, chairman of the department of surgery, who presented the findings in June at the annual meeting of the American Urological Association.

WEIGHING RISK: Doctors usually cannot explain why someone gets kidney cancer. However, certain risk factors may predispose a person to the disease. Studies show that smoking, obesity, high blood pressure, and a family history of kidney cancer can increase risk.

Viral ‘Fossils’ Found in Vertebrate Genomes

In an unexpected discovery, researchers have found that the genomes of humans and other vertebrates contain ancient genetic sequences from two deadly virus families.

It was known previously that retroviruses—RNA viruses that insert DNA copies of their genetic material into their hosts’ genomes when they replicate—have left behind bits of that material in vertebrate genomes. However, neither of the non-retroviral RNA families in question integrates its genetic material into its host.

“The finding says that the source of our genetic material is considerably wider than we thought,” says virologist Ann Skalka.

In comparing thousands of viral genes from non-retroviral families to the genomes of 48 vertebrate species, including humans, the research team uncovered 80 viral

sequence integrations into 19 species. Nearly all of the sequences come from ancient relatives of the Ebola/Marburg and Borna virus families, which include deadly pathogens that cause hemorrhagic fevers and neurological disease, respectively. The results were published in July in *PLoS Pathogens*.

Skalka explains the unexpectedness of the find: “These viruses replicate their RNA and are not known to make any DNA. They have no known mechanism for getting their genetic material integrated into the DNA of the host genome.”

Some of the sequences may have been integrated into the host genomes more than 40 million years ago. Their conservation suggests that they provide, or provided, some benefit to the hosts, such as protection from infections by related viruses.

Some Clinical Trials Exclude Gays, Lesbians

Fox Chase researchers have discovered that the exclusion of lesbians and gay men from clinical trials is not uncommon in the United States, particularly in studies related to sexual function or couples counseling.

Clinical trials are conducted under guidelines developed by the investigators that state who may participate. Typical criteria include factors such as age, gender, treatment history, type and stage of disease, and other medically relevant factors.

The researchers searched ClinicalTrials.gov, a website that provides information on more than 80,000 trials sponsored by the National Institutes of Health, other governmental agencies, and private industry, for criteria requiring participants to be in heterosexual relationships. Including only trials with sites in the United States,



they found that 15 percent of identified studies using the terms “erectile dysfunction,” “couples,” and “hypoactive” (related to hypoactive sexual disorder) included language exclusionary of gays and lesbians. In addition, industry-sponsored trials, multi-region trials, and Phase III trials were more likely to exclude lesbians and gay men.

“Most gay and lesbian patients are probably unaware that their sexual orientation is being used as a screening factor for clinical trial participation,” biostatistician Brian Egleston notes. “This is a potentially significant issue, both for patients and the medical research community.”

Findings of the study by Egleston, biologist Roland Dunbrack, and medical oncologist Michael Hall were published in a research letter in the March 18 issue of *The New England Journal of Medicine*.

Fat in Cell Membrane Helps Activate Cancer

Research has done much to elucidate the workings of cancer-inducing oncogenes and tumor-suppressor genes and how the proteins they produce can change the function of a cell from normal to malignant. By contrast, relatively little is known about the function of lipids, or fats, in cancer cells. Research by a Fox Chase scientist points to one type of lipid's potential role in triggering cancerous cell growth.

There are many types of lipids in the body—the membrane surrounding each cell is made up of a mix of lipids—and increases and decreases in some lipids are associated with disease, including cancer.

Cell biologist Jeffrey R. Peterson has long studied a signaling protein called Pak1 whose activity is important in cancer. When mutated, the protein causes cells to grow beyond their normal constraints, become invasive, and become resistant to drug and radiation therapies. In a study published in the November issue of *Molecular Cell*, Peterson and his colleagues identified an essential role for a type of lipid called a phosphoinositide in causing Pak1 to become active, even when not mutated. The researchers showed that binding to the phosphoinositide causes Pak1 to change shape and allows it to associate with other cancer-inducing proteins. That activity contributes to cancerous growth in multiple ways, including by enabling cells to divide more actively and making them harder to kill.

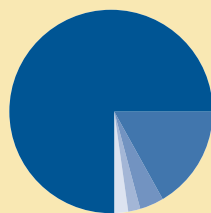
"This work implies that we need to think more carefully about how changes in cellular membranes that occur in cancer might be switching on Pak1 or other key signaling molecules inappropriately," Peterson says.

The study suggests that increased levels of phosphoinositides may help drive the cancer-promoting activities of Pak1. Through this research, Peterson is unraveling the fundamental processes by which lipids and proteins interact to control cell function.

FINANCIAL OVERVIEW

OPERATING REVENUES

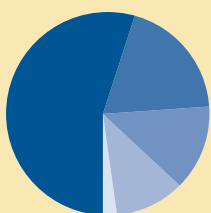
Total: \$338.7 million



- Patient-care revenue 75%
- Research grants & commercial support 17%
- Fundraising support 4%
- Governmental appropriation 2%
- Investment and other support 2%

OPERATING EXPENSES

Total: \$336.3 million



- Salaries and benefits 55%
- Supply and drug costs 19%
- Purchased services 13%
- Capital-related costs 11%
- Other 2%

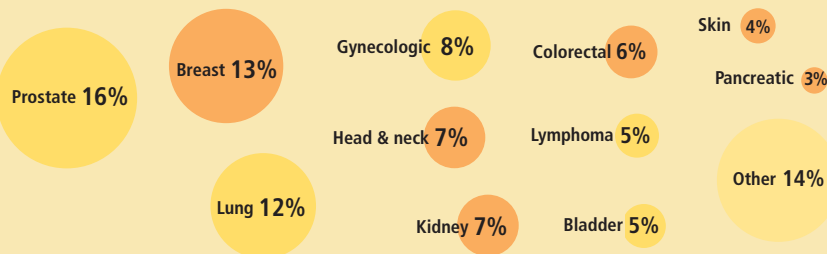
PATIENT CARE

NEW PATIENTS: 7,946

OUTPATIENT VISITS: 84,256

TOTAL PATIENTS SEEN: 33,435

TYPES OF CANCER TREATED



Data: 2009

30 physicians listed as *Philadelphia* magazine "Top Doctors"

70 basic science research programs

200 clinical trials under way

107 years of treating cancer patients

1,500 robotic surgeries performed (as of April 2011)

A MESSAGE FROM THE CHAIRMAN OF THE BOARD OF DIRECTORS



"I INVITE YOU TO JOIN IN
ENABLING THE DEDICATED
PEOPLE OF FOX CHASE TO ...
CONTINUE TO WIN VICTORIES
FOR HUMANITY."

Horace Mann, the nineteenth-century congressman regarded as the father of American public education, is one of my personal heroes. Mann was an idealist. Even after nearly two centuries, his belief that educated minds can better the condition of humankind remains inspirational.

In a speech to an 1830s high school graduating class, Mann appealed to the civic responsibility of those long-ago leaders-to-be by saying, "Be afraid to die until you have won some small victory for humanity."

I believe that the faculty and staff at Fox Chase Cancer Center rise to that honorable challenge every day. And the people listed on the following pages are their partners, living Mann's words in their purposeful philanthropy.

Our Laurel Society members demonstrate, through their support, that they recognize what makes Fox Chase so special: its skilled and caring people, who are committed to bold science, breakthrough medicine, and the best patient and family care, provided with a personal touch. It is this laudable mission that compels all of us on the board of directors to serve; our reward is the opportunity to be inspired by the daily triumphs made possible by Fox Chase researchers, clinicians, and staff members.

In this section, you will read three stories of inspiration: the family and friends so touched by a young women's cancer experience that they continue to support Fox Chase 35 years after her death; the former racehorse breeder who has placed his bets with Fox Chase for two decades; and three brothers, united for life in business and philanthropy.

I extend my heartfelt thanks to those whose partnership helps to equip this remarkable institution for its ambitious quest to prevail over cancer. And if you are not yet among us, I invite you to join in enabling the dedicated people of Fox Chase to respond to Horace Mann's challenge and continue to win victories for humanity.

Sincerely,

A handwritten signature in black ink, which appears to read "David G. Marshall". The signature is fluid and cursive.

David G. Marshall



Fox Chase thanks the following donors for their generous support in fiscal year 2010.

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(\$500,000+)

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Evelyn J. Swartz
Jane Villon
George D. Wasserberger
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Champions' Circle
(\$10,000 - \$19,999)

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Together (as they often are) at the headquarters of their furniture and textile company are, from left, brothers Arnie, Jerry, and Spencer Zaslow.

Band of Brothers

The Jerome M., Spencer and Arnold Zaslow Family Foundation

From an early age, brothers Arnie, Jerry, and Spencer Zaslow were schooled on the importance of family unity—a value that continues to guide their personal lives, work, and philanthropy. “No matter what you’re able to accomplish by yourself, you’ll always accomplish more together,” Arnie recalls his parents saying.

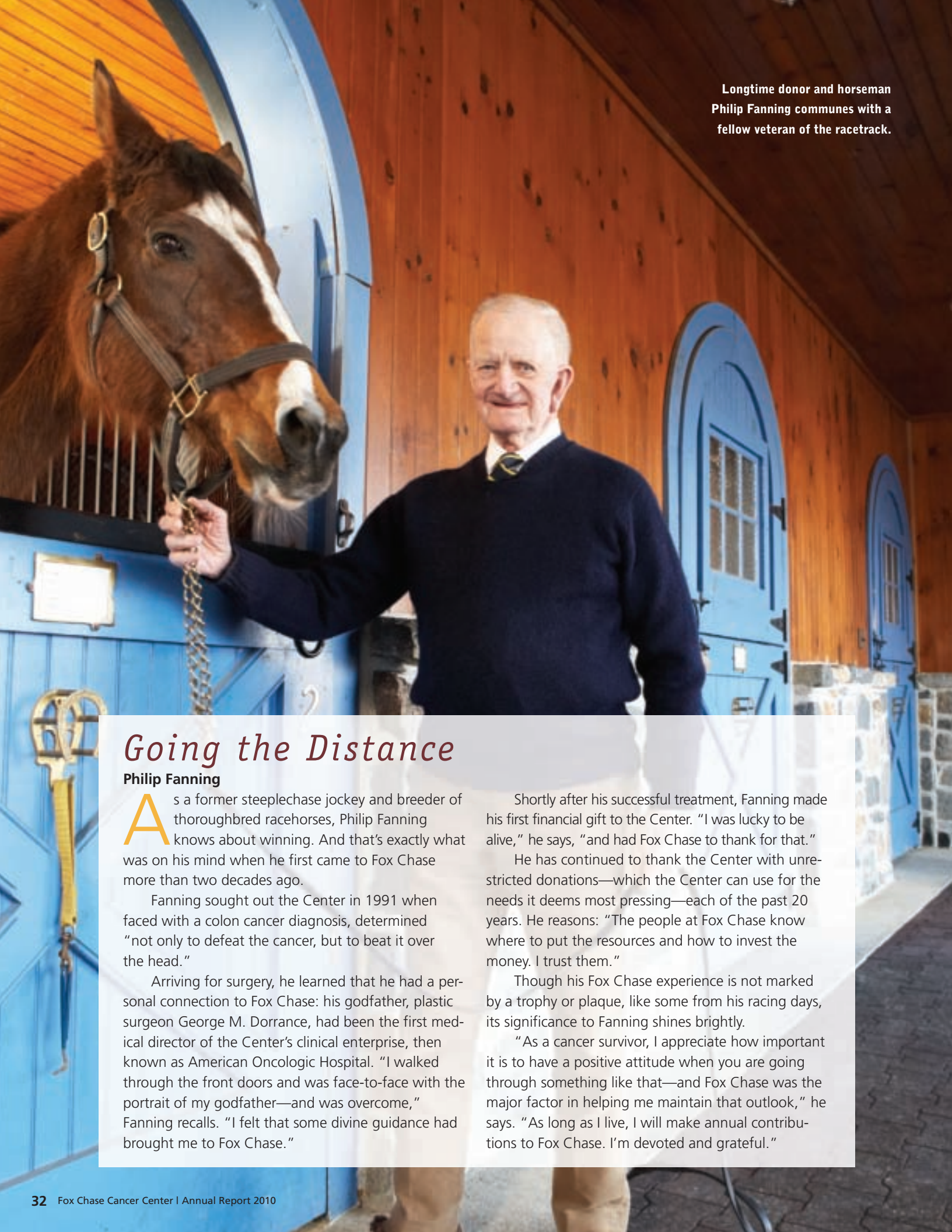
The brothers run the institutional furniture and textile company ATD-American Co., headquartered in Wyncote, Pennsylvania, which traces its origins to a linens store founded by their father in 1931. In 1989, they established the Zaslow Family Foundation, focusing their giving on medical, educational, and religious institutions.

Ten years ago, after Arnie’s wife Brenda was treated successfully for lung cancer at Fox Chase, the brothers initiated a challenge grant: They agreed to

donate \$100,000 toward establishing an endowed chair at the Center if Fox Chase raised an additional \$200,000. “We wanted to make our money go even farther by inspiring others to give,” Arnie says. The funding helped establish the Paul Grotzinger & Wilbur Raab Chair in Surgical Oncology.

A decade after their first gift, the Zaslow Foundation continues to support the work being done at Fox Chase—work like that of scientist Margie L. Clapper, whose research in lung cancer is examining the role of estrogen in the progression of the disease. “One day there will be a cure for this disease, and it’s going to be because of people like Margie,” Arnie says. “We feel so blessed to be able to support it.”

“I will always feel a connection to Fox Chase because of my wife,” he adds. “They saved her life—and in doing so, they also saved mine.”

A photograph of Philip Fanning, an elderly man with white hair, wearing a dark blue sweater over a white collared shirt and a patterned tie. He is smiling and holding the lead rope of a brown horse with a white blaze on its face. The horse is standing in a stable stall with blue wooden doors. The background shows the interior of a stable with wooden walls and several blue arched doors.

Longtime donor and horseman Philip Fanning communes with a fellow veteran of the racetrack.

Going the Distance

Philip Fanning

As a former steeplechase jockey and breeder of thoroughbred racehorses, Philip Fanning knows about winning. And that's exactly what was on his mind when he first came to Fox Chase more than two decades ago.

Fanning sought out the Center in 1991 when faced with a colon cancer diagnosis, determined "not only to defeat the cancer, but to beat it over the head."

Arriving for surgery, he learned that he had a personal connection to Fox Chase: his godfather, plastic surgeon George M. Dorrance, had been the first medical director of the Center's clinical enterprise, then known as American Oncologic Hospital. "I walked through the front doors and was face-to-face with the portrait of my godfather—and was overcome," Fanning recalls. "I felt that some divine guidance had brought me to Fox Chase."

Shortly after his successful treatment, Fanning made his first financial gift to the Center. "I was lucky to be alive," he says, "and had Fox Chase to thank for that."

He has continued to thank the Center with unrestricted donations—which the Center can use for the needs it deems most pressing—each of the past 20 years. He reasons: "The people at Fox Chase know where to put the resources and how to invest the money. I trust them."

Though his Fox Chase experience is not marked by a trophy or plaque, like some from his racing days, its significance to Fanning shines brightly.

"As a cancer survivor, I appreciate how important it is to have a positive attitude when you are going through something like that—and Fox Chase was the major factor in helping me maintain that outlook," he says. "As long as I live, I will make annual contributions to Fox Chase. I'm devoted and grateful."



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 BACKYARD. THANKS TO
 OUR GENEROUS CUSTOMERS
 AND DEDICATED EMPLOYEES,
 GENUARDI'S HAS SUPPORTED
 BREAST CANCER RESEARCH
 AT FOX CHASE SINCE 2007."



—Marianne D. Crager, Manager of Public Affairs
 and Government Relations, Genuardi's

Members and founding members of the Marlyn R. Fein Chapter of the Board of Associates are, from left, Rachel Fein-Baum; past president Ruth Chakov (seated); vice president Harriet Kauffman; Frank Fein; chapter president Penny Fisher; and David and Wilma Fein.

FOX CHASE CANCER CENTER

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A Living Legacy

The Marlyn R. Fein Chapter of the Board of Associates

They consider themselves Marlyn Fein's family, although many of them never met her. The Marlyn R. Fein Chapter of the Board of Associates, a volunteer fundraising group, continues to thrive and grow—and raise money for Fox Chase—35 years after Fein's death, at 25, from the bone cancer osteogenic sarcoma.

Frank Fein, Marlyn's widower, never imagined that the group would grow into the organization it is today. "We started raising money for Fox Chase with Marlyn's family, friends, and classmates," he says. "We wanted to honor her memory and help Fox Chase provide for others the kind of care she received."

With more than 200 members, the group is more active than ever. Through an annual program of events including holiday gift-wrapping, fashion shows, and bingo nights, the group has raised more than \$1 million for Fox Chase.

Throughout most of its history, the chapter has supported general research and patient care. This year, for the first time, it directed its support to three specific areas: the Keystone Program in Blood Cell Development and Cancer, the Women's Cancer Center, and the dermatology screening program. "Fortunately, because of the generosity of our members, we've been able to increase the amount we give to Fox Chase in recent years," says Penny Fisher, chapter president. "This year, we wanted to take a more active role in designating where the funds are applied."

What motivates the volunteers? "Every member has their own personal reason for joining, but it's the connections among us that keep us going," Fisher says. "Many of us live in the surrounding neighborhoods and know firsthand what a wonderful place Fox Chase is. This is our way to give back—and we have so much fun doing it."

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