

FOX CHASE Forward

BROADENING THE CONVERSATION ABOUT CANCER | WINTER/SPRING 2020

SHATTERING THE GLASS BEAKER

Women Past and Present Have Played
Key Roles at Fox Chase

MAKING THE UNCOMMON COMMON

For many of us, cancer is something familiar. It has touched us in some way, whether personally, in our families, or amongst our friends or colleagues. One might consider it a common thing, but to face it takes uncommon strength and exceptional insight.

Fox Chase Cancer Center is a place where uncommon things happen. Within our institution are people who are extraordinary—patients who carry on boldly through the seemingly impossible and clinicians, scientists, and staff who do the exceptional to help them prevail.

Our cover story in this issue of *Forward* highlights the role of women in science, particularly within our Center. In doing so, it also showcases Fox Chase's longstanding inclusion of different voices and new ideas in the pursuit of great science and medicine. These female trailblazers exercised ingenuity and held close a dedication to discovery, finding at Fox

Chase a culture and a leader who helped fuel their drive to contribute meaningfully to our understanding of cancer and to achieve greatness through their own career accomplishments.

With the help of new drugs called immune checkpoint inhibitors, we are seeing success treating patients in ways we haven't before. In these pages, we share how ongoing research is increasing our knowledge of the complexities of the human immune system and how to harness its power to kill cancer. In some cases, the positive effects of immune checkpoint inhibitor drugs last months to years. There is still much work to do. Right now, only a small number of patients' cancers respond to such drugs, but the results give new hope for the future.

It is an exciting time for us at Fox Chase. As we have done for decades, we continue to ask new questions, test new ideas, and discover new ways. We have tremendous support from our patients,



donors, and the entire Fox Chase family, and we look forward to new collaborations on the horizon that will help us get closer to more breakthroughs. Our story continues.

Richard I. Fisher, MD
PRESIDENT AND CEO

FOX CHASE *Forward*

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On the Cover: Chemist Mary Adelia Bennett (left) working in a lab in 1935. Lori Rink (right), an assistant professor in the Molecular Therapeutics Program, in her lab in 2019.



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FOX CHASE NURSE TRAVELS TO MOZAMBIQUE FOR VOLUNTEER WORK

Although based in Philadelphia, Fox Chase Cancer Center has a global reputation, a fact borne out by its many partnerships with other cancer centers and researchers around the world. But that global reach also extends to volunteer work. Recently, registered nurse Dana Adamson traveled to Mozambique with a group of nurses to provide medical services.

They traveled to Macadeira, a small rural community, with a group organized by Nurses for Africa, which is located in the

“They were unable to give us anything back, so instead they prayed for us. It was extremely memorable.”

— DANA ADAMSON,
FOX CHASE REGISTERED NURSE

United States but partners with Hands at Work, a local group of mission workers in Africa.

The nurses hosted two days of clinics which involved vital signs, assessments, and wound care; people were also prescribed medications by nurses from more developed areas of Mozambique. During those two days they saw over 700 people, Adamson said.

According to Hands at Work, there is “no shortage of challenges” in Macadeira. “Hunger and starvation are prevalent, as are the risks of HIV/AIDS and malaria. Abuse in relationships between husbands and wives and between parents and children has fostered a spirit of brokenness throughout



Fox Chase nurse Dana Adamson with some of the children she met on her volunteer trip to Mozambique.

the community.”

On their other days there, Adamson said, the nurses did a day of teaching for both the care workers, who are women in the community that take care of their own family plus other families, and the children. They taught hand washing, hygiene, nutrition, wound care, seizure care, and burn care. They also distributed soap, toothbrushes, toothpaste, and other items.

On the last day of the trip, they

were able to thank the care workers in the community for their work by giving them large bags of rice, two liters of oil, and a bag of salt, things that are extremely difficult for them to even purchase.

“They were unable to give us anything back, so instead they prayed for us. It was extremely memorable,” Adamson said.

HIGH SCHOOL STUDENTS CREATE ART TO HIGHLIGHT THE CANCER JOURNEY OF PATIENTS

Getting diagnosed and treated for cancer is easily the most difficult event someone can go through in their life. Some patients try to understand their struggle through words or music. And sometimes, art created by others can play a role.

Beyond the Canvas grew out of an outreach effort by Amanda Purdy, director of Academic Affairs, and Glenn Rall, chief academic officer, at Fox Chase Cancer Center.

The CentennialX Student Design program was created by Ignacio Jayo, a science teacher at William Tennent High School in Warminster.

After meeting with Fox Chase staff, two honors art students at Tennent, Diraya Serrano and Tyler Yannuzzi, were chosen to meet with cancer patients and interpret the patient journey

through artwork. Helen Gordon, director of Volunteer Services and co-chair of the art committee, helped get the project approved and implemented.

Yannuzzi used paper tape on matboard to depict patient Lainie Sykes's place of tranquility. Serrano chose clay as her medium and created a large vase depicting various scenes representing the story of patient Judy Bernstein. Serrano then painted the three sides of the vase to illustrate various aspects of Bernstein's journey. One painting featured the sun shining through clouds.

"The sun shining light behind the clouds represents her ability to shine through cloudy situations," Serrano wrote of the painting and Bernstein's positive attitude. "While facing cancer, she had a vision of purpose and never lost sight of that through foggy

circumstances."

Tennent art teacher Rena Friedant helped guide the students through their artistic journey with help from the

"While facing cancer, she had a vision of purpose and never lost sight of that through foggy circumstances."

— DIRAYA SERRANO, STUDENT ARTIST

Doylestown Art Studio, which provided the students with space to create the art. When their pieces were done, Serrano and Yannuzzi were able to showcase their work at the Women's Center at Fox Chase.



THOMAS STEPHANO

GENOMIC DIFFERENCES IN COLORECTAL CANCER IN YOUNGER PATIENTS MAY HAVE TREATMENT IMPLICATIONS

The incidence of colorectal cancer (CRC) continues to increase in adults under age 50, in contrast to stable rates of late-onset disease. To determine if the rise in early-onset disease reflects a distinct profile of somatic driver mutations, researchers at Fox Chase Cancer Center have compared the genomic landscape of CRC in younger patients to that in older patients. Their analysis found differences in

molecular carcinogenesis affecting genes relevant to treatment decision-making.

The paper, which was published in *Clinical Cancer Research*, is the most comprehensive analysis of the genomic landscape in young-onset CRC cancer patients that has been reported to date, analyzing mutations in over 18,000 CRC patients.

Joshua E. Meyer of the Department of Radiation Oncology, Deputy Chief Science

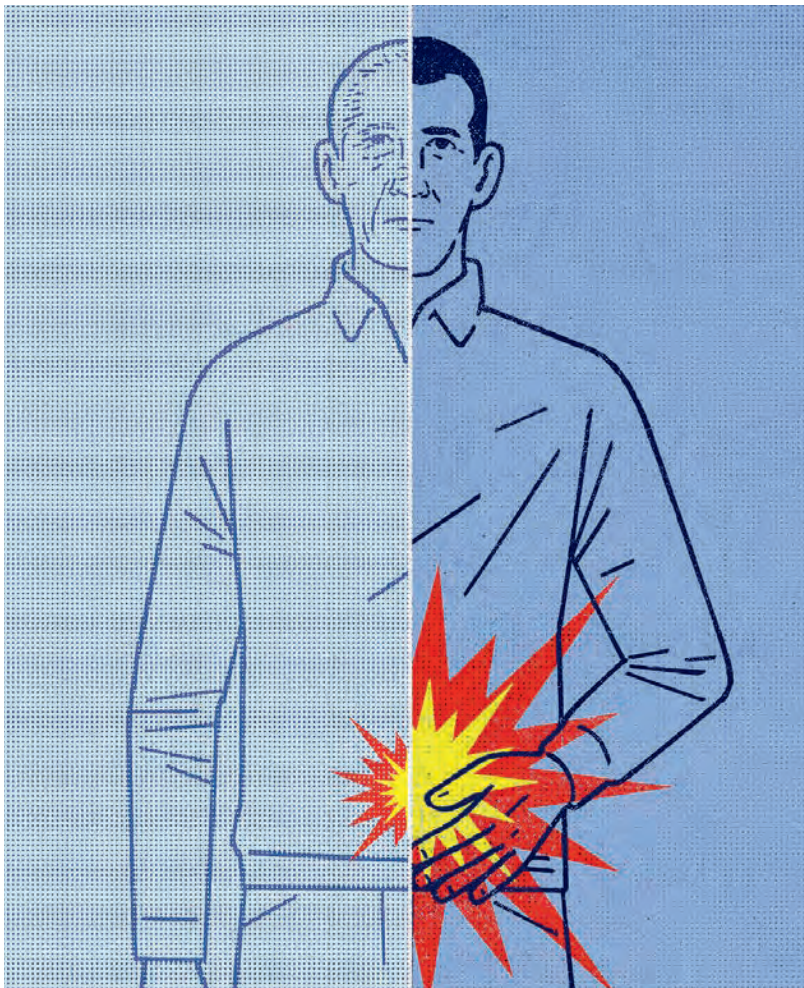
Officer and co-leader of the Molecular Therapeutics Program Erica Golemis, and other colleagues concluded that, while similar overall, there were significant differences in several genes relevant to the biology of early-onset cancer. These differences may impact response to therapy in young versus old patients.

“Our new study provides more evidence that young-onset colorectal cancers may arise from different processes from those diagnosed in older patients.”

— JOSHUA E. MEYER,
RADIATION ONCOLOGIST

“Colorectal cancer incidence in younger adults has been increasing since the mid-1980s and mortality rates have begun to increase among this group in the last decade after multiple decades of decline. Our new study provides more evidence that young-onset colorectal cancers may arise from different processes from those diagnosed in older patients,” Meyer said.

“Further research is needed to determine if the differences in gene alteration rates can be leveraged to provide personalized therapies for young patients with early-onset sporadic CRC,” he added.



BRCA1 GENE REARRANGEMENTS MAY HELP IDENTIFY PARP INHIBITOR RESISTANCE

New research published in *Nature Communications* indicates that BRCA1 gene rearrangements are responsible for generating partially active proteins that drive resistance to PARP inhibitors.

Individuals with *BRCA1* mutations are at significantly increased risk for developing breast and ovarian cancers. Women who develop *BRCA*-mutated cancer may benefit from treatment with PARP inhibitors, drugs which block an enzyme involved in certain cell functions, including the repair of DNA damage.

“PARP inhibitors have been shown to be very effective at

prolonging disease-free survival in *BRCA*-mutated ovarian cancer, but eventually the majority of patients will develop drug resistance,” said Neil Johnson, associate professor in the Molecular Therapeutics program at Fox Chase Cancer Center.

Uncovering the biology of drug resistance may enable the development of treatment strategies that prevent resistance from occurring altogether and potentially help identify which patients are most likely to benefit from PARP inhibitors.

Johnson’s lab is focused on how *BRCA1* mutations might develop resistance. “We found that a group of *BRCA1* mutations in the BRCT domain have a particular

mechanism that involves rearrangement of the *BRCA1* gene. The consequence of having a mutation in this domain is that it causes the whole protein to become degraded.”

Johnson and postdoctoral fellow Yifan Wang found that when cells become resistant to PARP inhibitors, the *BRCA1* gene changes the way it is arranged in the chromosome. That leaves behind the BRCT domain mutations that are causing the whole protein to get degraded.

“Now, it does not get degraded. It is stable and it can contribute to the repair of DNA damage. Because it repairs DNA damage, it also promotes resistance to the PARP inhibitor.”

FINDINGS MAY POINT THE WAY TO MODULATING EGFR INHIBITOR RESPONSE

Understanding how tumor cells become resistant to drugs used to treat them is one of the greatest challenges faced by cancer researchers. In a new study, researchers from Fox Chase Cancer Center describe how cancer cells use epigenetic mechanisms to control amplification of a critical cancer gene that impacts cell proliferation and drug response. The researchers believe the findings provide a basis for developing novel drugs or combinations of drugs.

EGFR (human epidermal growth factor receptor) is found in normal cells and in high levels in some types of cancer cells. EGFR DNA amplification tends to occur in hard-to-treat cancers such as

lung, colorectal, and brain cancer. Blocking EGFR can slow the growth of cancer cells.

Amplification is a double-edged sword. Although it makes drugs

The researchers believe their findings provide a basis for developing novel drugs or combinations of drugs.

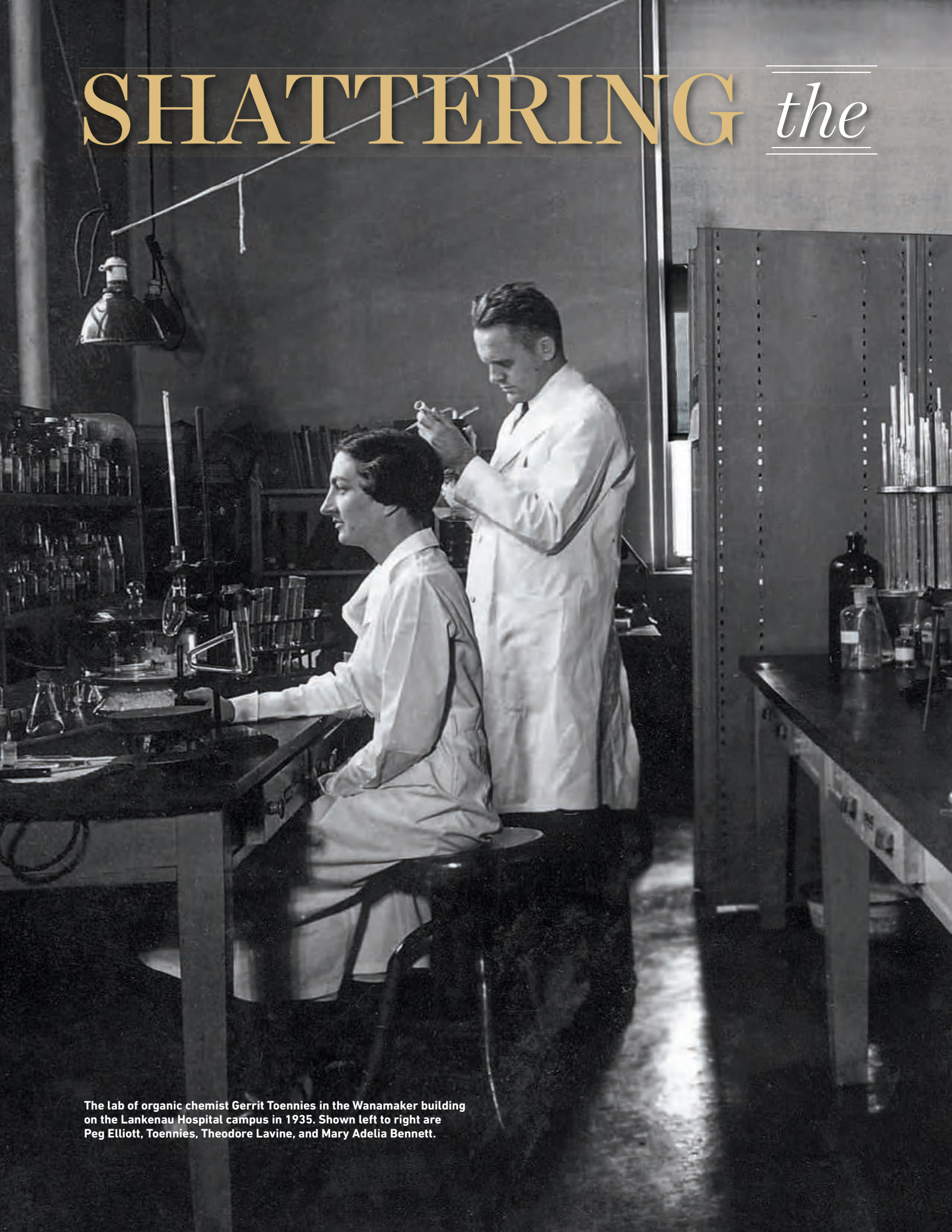
targeting that gene more effective, prolonged treatment with EGFR inhibitors can reduce the copies of EGFR, leading to drug resistance, said Johnathan R. Whetstine, head

of the Cancer Epigenetics Program.

“Our data suggests that if we target these epigenetic modifiers we can dial up or down EGFR amplification and, in turn, modulate the associated drug response. We believe that this could provide a more homogeneous cell population, which might result in more consistent response to drugs targeting the pathway,” Whetstine said. The research was published in *Cancer Discovery*.

“We showed that copy number is druggable by targeting the epigenetic factors involved, which has significant clinical implications. Therefore, we can turn levels of copy gains up or down, and in return, change responses to growth factors and drugs.”

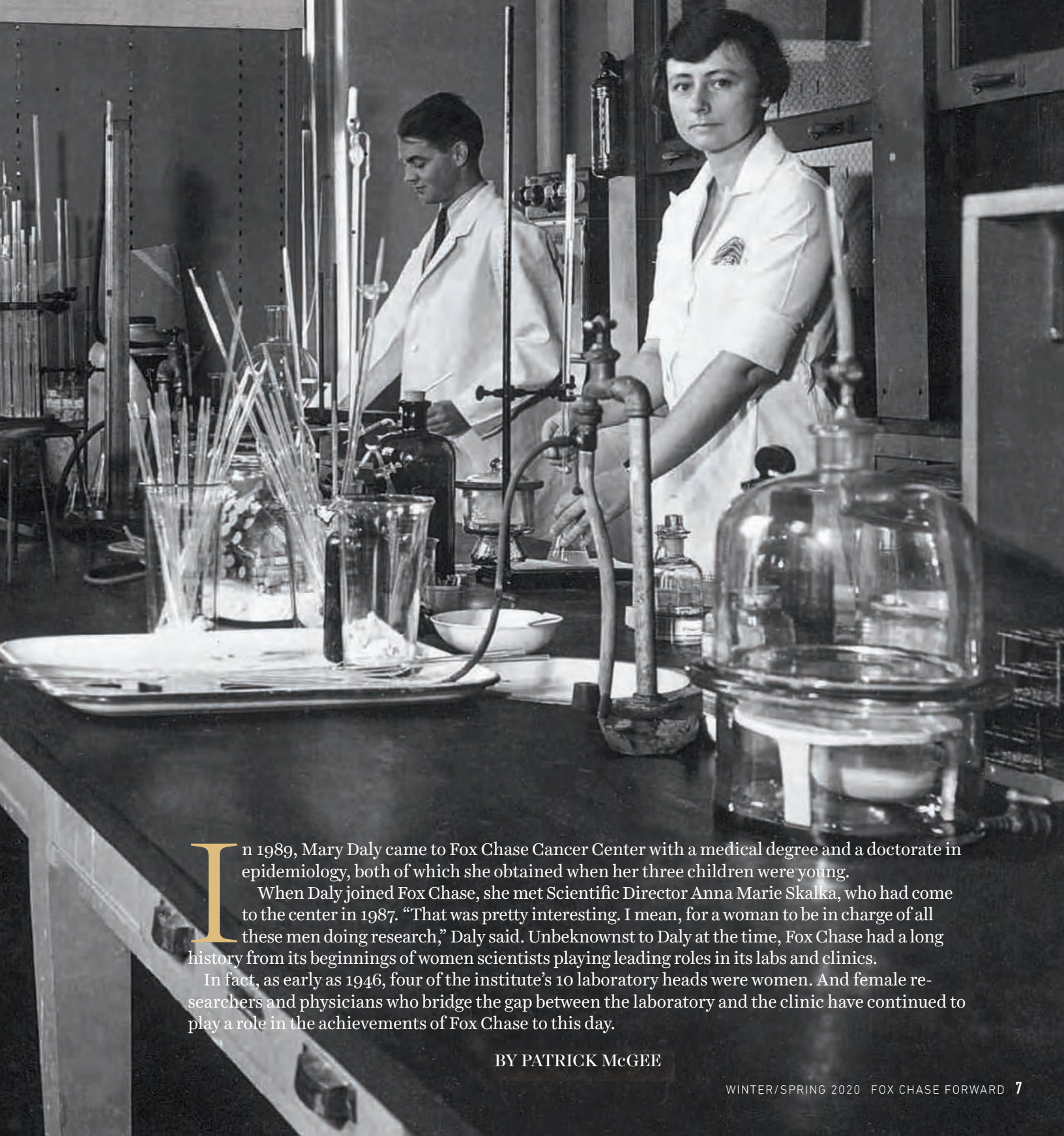
SHATTERING *the*



The lab of organic chemist Gerrit Toennies in the Wanamaker building on the Lankenau Hospital campus in 1935. Shown left to right are Peg Elliott, Toennies, Theodore Lavine, and Mary Adelia Bennett.

GLASS BEAKER

Women Past and Present Have Played Key Roles at Fox Chase



In 1989, Mary Daly came to Fox Chase Cancer Center with a medical degree and a doctorate in epidemiology, both of which she obtained when her three children were young.

When Daly joined Fox Chase, she met Scientific Director Anna Marie Skalka, who had come to the center in 1987. “That was pretty interesting. I mean, for a woman to be in charge of all these men doing research,” Daly said. Unbeknownst to Daly at the time, Fox Chase had a long history from its beginnings of women scientists playing leading roles in its labs and clinics.

In fact, as early as 1946, four of the institute’s 10 laboratory heads were women. And female researchers and physicians who bridge the gap between the laboratory and the clinic have continued to play a role in the achievements of Fox Chase to this day.

BY PATRICK MCGEE

In 1927, Stanley P. Reimann, a physician, and Frederick Hammett, a biologist and biochemist, founded the Lankenau Hospital Research Institute, which later morphed into the Institute for Cancer Research before merging with the American Oncologic Hospital. The end result is what is now known as Fox Chase Cancer Center.

The two men had what seemed to be an odd premise to many of their fellow scientists and clinicians at the time: To learn about cancer and the abnormal cell growth that define it, it was necessary to study the normal growth and development of cells. They were ridiculed by many for the direction of their “so-called” cancer research.

The two did something equally unusual—they hired a number of women as researchers at a time when research labs were dominated by men.

This history was not accidental. In 1927, Reimann laid out a strategy for the type of research to be done and the people who would execute it. He wrote that the approach was “one in which a large problem is adopted with a diverse staff to attack the problem by way of various disciplines and techniques.”

This “diverse staff” included a number of women researchers who would go on to long, distinguished careers and become leaders in their fields. According to “Growth: A History of the Institute for Cancer Research,” Reimann’s confidence in the abilities of women as researchers “was perhaps one of the major factors that contributed to his success in spreading knowledge of cancer and in weathering the many crises he encountered in establishing the Lankenau Hospital Research Institute on a firm footing.”

The history was written by Elizabeth Patterson, who was recruited by Reimann in 1944 after earning her doctorate at Bryn Mawr College.

REIMANN’S FIRST ASSISTANT

THE FIRST RESEARCHER THAT REIMANN HIRED WAS MARY Adelia Bennett, who became his assistant. She started working part time with him in 1921, and he encouraged her to pursue graduate studies at the University of Pennsylvania, where she received a doctorate in physiological chemistry in 1926.

“Dr. Bennett’s early years at the laboratory in some ways mirror the stresses of women scientists to obtain their academic degrees and their independence at that time,” Patterson wrote. Bennett lived on very little money since she

could only work part time while pursuing her doctorate. She was also caring for an invalid mother.

Her accomplishments include many journal publications throughout the 1940s and 1950s in general biochemistry. Some of that work included preparation of various liver extracts that led to the isolation of vitamin B12. She was also the recipient of the Robert McNeil Fellowship.

BENEFIT OF GEOGRAPHY

PHILADELPHIA, WHERE FOX CHASE IS LOCATED, HAS LONG been a center for scientific and medical education and research. The first medical school in the United States opened in 1765 at the College of Philadelphia and eventually evolved into the University of Pennsylvania’s Perelman School of Medicine. Scientists and physicians have long used the city as a starting point or a home base for their endeavors.

“The fact that a woman could get a PhD degree and then get a job was really different than in other parts of the world,” said Marilyn Bailey Ogilvie, professor emeritus in the Department of the History of Science at the University of Oklahoma. She is coeditor of “The Biographical Dictionary of Women in Science,” and the author of several books on the history of women in science.

Another unique thing was that women researchers at Fox Chase were being paid the same as their male counterparts. In a 1985 interview, Patterson said, “There was no discrimination whatsoever. Salaries were the same.”

Ogilvie said that pay equity is “very surprising” for its time. She also noted that generally, once women got into the laboratory, they trained other women to do the same work. “That’s the pattern that I’ve seen,” she said. That pattern of handing scientific knowledge down would recur throughout the history of Fox Chase, with one generation of women researchers passing their knowledge along to the next.

As the staff continued to grow, more women were brought on board, including Grace Medes, who earned her doctorate in zoology at Bryn Mawr in 1916. Before coming to the institute in 1932, she taught at Vassar and Wellesley and was an assistant professor of medicine at the University of Minnesota, where she became known for her work in biochemistry.

Despite her credentials, Reimann had a hard time convincing his colleague Hammett to take her on, and he was not helped much by the negative feedback he was getting from some of her colleagues at Minnesota. One wrote that

“I also thought that this would be a place where you could flourish as a person running a small independent laboratory that explored creative ideas.”

— ERICA GOLEMIS, DEPUTY CHIEF
SCIENCE OFFICE, FOX CHASE
CANCER CENTER



Margie Clapper (left), deputy chief science officer, and Mary Daly (right), director of the Risk Assessment Program, discuss the genesis of colorectal cancer in this 2009 photo.

although she was “a worker and cooperative,” she was also “eccentric as all hell.”

But Reimann remained undaunted, and wrote to Hammett that Medes wanted to work at the institute because she believed “we are doing the best work in the country.” He went on to press his case in a later letter to Hammett: “I just know we are going to get much good work from Grace Medes.... I shall back her to the limit.”

Once again, Reimann was on the mark, as Medes went on to a long and distinguished career, culminating in 1955 with the Garvan Medal (now the Garvan-Olin Medal) from the American Chemical Society for her work. She and Reimann co-authored a book, “Normal Growth and Cancer.”

During Medes’ late career at Fox Chase, two other female researchers appeared on the scene who would play a key role in groundbreaking work. One, Jenny Pickworth Glusker, arrived in 1956 after training with a Nobel Prize-winning scientist (see “A Way to Continue Working,” page 13). In 1960 geneticist Beatrice Mintz began a long and illustrious

career in which she developed mouse models that allowed scientists to identify links between development and cancer (see “Seeking Answers to Big Questions,” page 10).

BRIDGING THE GAP

AS RESEARCHERS LIKE GLUSKER AND MINTZ WORKED IN the confines of their labs, others like Daly were working to bridge the gap between the research lab and the clinic. After earning her doctorate from the University of North Carolina at Chapel Hill (UNC), Daly got a job in public health, but became frustrated because she realized she didn’t understand the diseases she was studying. “I knew how to design the studies and do the statistics, but I didn’t know the physiology of those diseases. So I figured at this point I had to go to medical school,” she said. Daly received her medical degree from UNC as well.

After an oncology fellowship, she knew she wanted to integrate her oncology and public health experience. “There weren’t many jobs that matched my vision. That is, I didn’t want to be someone who just did clinical trials in medicine. I wanted to bring in my epidemiology experience and look at prevention.”

She was brought to Fox Chase as the associate director of the Cancer Control Science Program by a pioneer in prevention, Paul Engstrom. She also brought her interest in genetics with her. “I started a makeshift genetics high-risk program, probably a year or two after coming here. It eventually blossomed into what is now the department of clinical genetics.”

Read More About Women in Science

To read full-length profiles of women in science and research at Fox Chase Cancer Center, go to www.foxchase.org/about-us/history/women-science.



SEEKING ANSWERS to the BIG QUESTIONS

Geneticist Beatrice Mintz came to Fox Chase in 1960 with a doctorate in zoology from the University of Iowa, time spent teaching at the University of Chicago, and an interest in asking what she called “big questions.” In her research, she developed mouse models that allowed scientists to identify links between development and cancer.

Her work, for which she received numerous awards, also allowed scientists to explore the biology of cancer over an animal’s lifetime. She is widely recognized as a pioneer in the field of developmental genetics and its relation to cancer biology.

“Dr. Mintz’s scientific insights have led to new directions in developmental cancer biology and genetics,” Margaret Foti, chief executive officer of the American Association for Cancer Research, said in 2012 when Mintz received the organization’s award for Lifetime Achievement in Cancer Research. “Her groundbreaking work has helped shape our understanding of stem cell behavior and the tumor microenvironment in cancer, and has provided scientists with important tools to study the many types of cancer.”

In 2011, Mintz was awarded the 6th Annual Szent-Györgyi Prize for Progress in Cancer Research from the National Foundation for Cancer Research. The organization said it awarded the prize for her discoveries of the relationship between development and cancer, which were based on her development of various mouse models of cancer. Her work has enabled the study of cancer and other genetic diseases in whole organisms.

“This was the first successful work of its kind,” Mintz said in a 2009 interview regarding work with mouse embryos. “Very few labs at the time were attempting to perform experiments on mammalian embryos. That required new technology. I came from a do-it-yourself family—you didn’t buy things that you could make—and I enjoyed the fact that I had to work out everything myself.”

ALREADY AN ACCOMPLISHED CAREER

BY THE TIME SHE ARRIVED AT FOX CHASE, THE WOMAN who had impressed Daly so much, Ann Skalka, already had an accomplished career. She spent 18 years at the Roche Institute of Molecular Biology, a basic research institution funded by the pharmaceutical company Hoffmann-LaRoche. She started as an assistant professor, immediately after postdoctoral training with Nobel laureate Alfred Hershey, and eventually rose to assistant vice president and head of the department of molecular oncology.

Skalka’s parents were immigrants who worked at a production plant for the pharmaceutical company Pfizer located in Williamsburg, Brooklyn. Pfizer offered part-time summer jobs to the children of employees, and that is how Skalka was first exposed to a working laboratory while in high school. The group she was assisting was experimenting with the use of various plant materials as possible screens for drug toxicities.

In a short memoir that was published in the scientific journal *Annual Review of Virology*, Skalka wrote that during that time she “discovered that science could be fun and scientists could be both interesting and kind.” In an interview, she said her career benefitted by being in large urban areas like New York and Philadelphia, where the idea of a woman scientist did not seem as foreign as it may have in other parts of the country.

Skalka went on to get a doctorate in microbiology from New York University Medical School and become internationally known for contributions to understanding how retroviruses replicate and insert their genetic material into the host genome. Although the most well-known retrovirus, HIV, causes AIDS, many retroviruses cause cancer in animals and some cause cancer in humans. Skalka’s work has greatly informed the study and treatment of both diseases.

RECOGNIZED ROLE MODELS

A YEAR BEFORE SKALKA CAME TO FOX CHASE, MARGIE Clapper arrived, fresh from getting her doctorate in genetics and cell biology from the University of Connecticut at Storrs. Clapper grew up on a dairy farm in upstate New York and was intrigued by the intricacies of biological systems early in life. Her undergraduate laboratory experience at the State University of New York at Oneonta shaped her future career path.

After completing the requirements for veterinary school, she instead accepted a research opportunity as a technician in the laboratory of Norman Klein at UConn. Klein, focused on identifying the causes of abnormal embryonic development, quickly recognized her potential and encouraged her to enter the doctorate program. Her work revealed that anticonvulsants can induce birth defects in the offspring of mothers with epilepsy. In 1986, she began to apply her drug-related expertise to cancer as the first postdoctoral fellow in the



Ann Skalka, who came to Fox Chase in 1987 with nearly 20 years of experience as a cancer researcher, focuses on the link between retroviruses and cancer.

newly formed Pharmacology Department at Fox Chase and has remained a leading researcher at the institution.

“With the opening of the Phase I clinical unit adjacent to our lab came unique opportunities to test new experimental therapies in patients with advanced-stage disease,” said Clapper. “Our ability to obtain biological specimens in real time from these courageous patients—literally bench to bedside—is an early example of what we now know as translational research.”

According to Clapper, it helped to have internationally recognized role models like Glusker and Mintz already here when she arrived. “The message from all of them was that you have to work hard and stick up for what you believe,” said Clapper, who was recently named the Samuel M.V. Hamilton Chair in Cancer Prevention. She has also been co-leader of the Cancer Prevention and Control program for the past decade and is a deputy chief science officer.

CLINICAL AND TRANSLATIONAL RESEARCH

ALTHOUGH MUCH RESEARCH AT FOX CHASE IS LABORATORY-based, the mission of a comprehensive cancer center also embraces clinical research across multiple areas of oncology. Respected faculty, including Elin R. Sigurdson, Lori Goldstein, Elizabeth Plimack, and Margaret von Mehren,

lead clinical studies that help advance therapeutic options for patients.

In addition to clinical studies, von Mehren is very involved in translational research with a laboratory-based partner. Originally joining Fox Chase in 1993 for a fellowship in medical oncology, von Mehren is now physician director for the Clinical Trials Office and associate director for clinical research. One of the several forms of cancer she has done research on is gastrointestinal stromal tumors (GIST).

Some of that research is a collaboration with Lori Rink, an assistant professor in the Molecular Therapeutics Program. Rink, who got her doctorate in molecular biology at Temple University, came to Fox Chase in 2006 and has stayed to focus her research on GIST, a rare cancer, and Gleevec, a drug approved by the Food and Drug Administration in 2002 to treat GIST.

Prior to Gleevec, the only option for patients with GIST was surgery, so the drug has changed the lives of many patients. But for most, it eventually stops working, and Rink and von Mehren want to understand why. They have received large grants to investigate the problem and have also identified genetic markers that could predict how patients will respond to Gleevec. They are also investigating using a combination of drugs to attack GIST.

Prior to working with von Mehren, Rink had another mentor, but he took a position elsewhere, just as Rink received a prestigious five-year grant. The first two years of the grant required a mentor for training, so Rink turned



to von Mehren and Erica Golemis, chair of the Molecular Therapeutics Program.

“I’m very grateful for both of them because you wonder what you’re going to do next once the person you’ve trained under has left,” she said. “Meg was very supportive and said, ‘I’m happy to stand in there as your mentor. I know you can do this.’ She had a strong belief that I could eventually run the lab.” Rink now has two graduate students and a postdoctoral fellow in her lab.

Rink said she feels very lucky having successful scientists such as von Mehren and Golemis in her corner. “I get two different perspectives, that clinical perspective from Meg, which is really, really important for a translational scientist, but also, some of the nitty gritty in terms of what methods or analyses to use from Erica.”

Golemis has a long history of working with up- and-coming researchers. She arrived in 1993 following an undergraduate degree at Bryn Mawr College, a doctorate from the Massachusetts Institute of Technology, and postdoctoral training in molecular biology and genetics at Massachusetts General Hospital and Harvard Medical School.

In addition to being a deputy chief science officer and leader of the Molecular Therapeutics Program, she is also the William Wikoff Smith Chair in Cancer Research. She is well known for her work in studying errors in cell signaling

Sanjeevani Arora of the Cancer Prevention and Control Program is researching the effectiveness of treatments for colorectal cancer. She is shown here at the microscope used to identify the Philadelphia chromosome at Fox Chase in 1959, the first conclusive evidence linking cancer and genetics.

that cause aggressive tumor growth, as well as research aimed at improving the use of clinical agents that can selectively target tumors.

In her time at Fox Chase, Golemis has worked with dozens of graduate students, postdoctoral fellows, and clinical fellows. Golemis said she was attracted to Fox Chase because it seemed like it had a very collegial environment, where time spent mentoring the next generation of scientists would be valued.

“I also thought that this would be a place where you could flourish as a person running a small independent laboratory that explored creative ideas,” she said. She was also impressed by Skalka, who was the scientific director when she was first hired. “I thought Ann Skalka was a fantastically inspirational leader, a brilliant scientist, and a role model.”

THE NEXT GENERATION

FOX CHASE HAS NEVER RESTED ON ITS LAURELS AND ITS commitment to women in science remains. While the institution recognizes the numerous challenges women

face, it has implemented important programs, including guest lectures led by women, scientific colloquiums with strong women representatives, mentorship programs, academic interest groups, and career development events. Director of Academic Affairs Amanda Purdy oversees a training program that is noteworthy for its gender and ethnic diversity.

Among the newest members of the Fox Chase faculty, and one of the beneficiaries of those programs, is Sanjeevani Arora, an assistant professor in the Cancer Prevention and Control Program. She thinks as highly of Golemis as Golemis does of Skalka. After her previous mentor left Fox Chase, Arora began working with Golemis. “If not

“Dr. Bennett’s early years at the laboratory in some ways mirror the stresses of women scientists to obtain their academic degrees and their independence at that time.”

— FROM “GROWTH: A HISTORY OF THE INSTITUTE FOR CANCER RESEARCH”

for her encouragement, I don’t think I would be doing what I’m doing. I think she saw something in me and really helped me move forward.”

One aspect of Arora’s research focuses on ways to determine the effectiveness of treatments for colorectal cancer, with the ultimate goal of more individualized treatment and preventing some patients from being treated unnecessarily. Clapper is one of her mentors for that research.

In addition to her work in the lab, Arora also founded a professional development and networking group for women in science at Fox Chase in 2013. The group invites speakers in to discuss their career paths and challenges. “There are challenges that I’ve faced when I’ve worked on projects, and it’s been hard to move things forward sometimes. But having the right kind of mentorship has helped,” Arora said.

For Arora and her many female colleagues on the Fox Chase faculty, respect for facing such challenges is certainly well deserved. ♦



A WAY TO CONTINUE WORKING

Jenny Pickworth Glusker was born in Birmingham, England. Both her parents were doctors. After several years of practicing medicine and having three children, Glusker’s mother Jane stayed home to raise them. When she wanted to return to practice, the system in place in England at that time would not allow her to compete with other doctors in the area.

“She was very frustrated that she could not continue with a career that she had put so much energy into,” Glusker wrote in a memoir that she penned for the American Crystallographic Association, an organization she once served as president. “For this reason, I decided that I would find a way to continue working, even if I had children.”

She did that and much more.

Glusker went to Somerville College, one of the women’s colleges at Oxford. The person who interviewed her for admission to the program and who she would do her graduate work with was Dorothy Hodgkin, who would go on to win the Nobel Prize in Chemistry in 1964 for confirming the structure of penicillin and determining the structure of vitamin B12.

Following a postdoctoral fellowship with Nobel prize chemist Linus Pauling at the California Institute of Technology, Glusker came to Fox Chase Cancer Center in 1956 after being hired by Stanley P. Reimann, one of the founders of Fox Chase. “There were quite a lot of women that he brought along,” Glusker said. “He went out of his way to make me feel welcome.”

During her time at Fox Chase, Glusker’s work with X-ray crystallography included the determination of the structures of numerous antitumor agents and chemical carcinogens, as well as investigating the structures and possible mechanisms of action of several biological enzymes.

PICKING THE LOCK

CHECKPOINT INHIBITORS HELP IMMUNE SYSTEM IN CANCER BATTLE

John Lens, 76, a retired teacher from New Jersey, does not know many of the details of the immunotherapy treatment he underwent for his Stage 4 urothelial cancer, upper urinary tract cancer that had begun to spread to his kidney. He leaves that to his wife, Iride. What he does know is that the drug, an immune checkpoint inhibitor called pembrolizumab, and his team at Fox Chase Cancer Center, saved his life.

“They deserve a Nobel Prize,” he said.

As a matter of fact, an American and a Japanese researcher shared the 2018 Nobel Prize in Physiology or Medicine for their discovery of cancer therapy by inhibition of negative immune regulation. Their work directly led to the development of the class of drugs called checkpoint inhibitors, of which pembrolizumab (Keytruda) is one, which have significantly improved the treatment of a variety of cancers over the last decade.

BY LEAH LAWRENCE
ILLUSTRATION BY BRIAN STAUFFER



“We all have an immune system, and its job is to recognize and kill certain things in the body, such as infections or cancers,” said Daniel M. Geynisman, a medical oncologist at Fox Chase who specializes in genitourinary cancers. “One of the hallmarks of cancer growth is that some cancers are able to evade the immune system.”

The body’s immune system has mechanisms that tell it to shut off or lock the door when a “job” is complete and there is no more work to be done. Cancers can take advantage of that system by giving off similar signals.

“Immunotherapy using checkpoint inhibitors is designed to reinvigorate the immune system by blocking those signals and reminding the body to attack the cancer,” Geynisman said.

FINDING A TARGET

The first checkpoint inhibitor for cancer was approved in the United States in 2011. Ipilimumab (Yervoy) targets a switch on immune cells called CTLA-4. This first approval was based on a clinical trial that showed the drug extended the life of patients with metastatic melanoma by about four months. It was the first drug to ever extend the survival of patients with metastatic melanoma.

Pembrolizumab targets a different pathway on immune and tumor cells called PD-1/PD-L1. Pembrolizumab and a multitude of other PD-1/PD-L1 inhibitors are now available to treat nearly a dozen types of cancer.

John was lucky enough to be the last person enrolled in a clinical trial testing pembrolizumab in his type of cancer, gaining him access to the drug before it was approved in 2017.

Seemingly healthy, John was on a school trip to Costa Rica in January 2016 with his wife and some of her students when he first noticed blood in his urine. Upon returning home, he scheduled an appointment with his urologist, who performed a urine lab test. He was diagnosed with upper urinary tract cancer that had begun to spread to his kidney.

John immediately underwent surgery to remove one of his kidneys and ureters, the tube that passes urine from the kidney to the bladder. “After the surgery they told us, ‘Everything looks great!’” Iride Lens recalled.

The PET scan at John’s follow-up visit in June 2016 revealed, however, that his cancer had spread to his lymph nodes and appeared aggressive. It was Stage 4.

They were devastated by the diagnosis but buckled down and began to do as much research as they could. Then they saw a question on the cover of *Time* magazine that caught their attention: “What if your immune system could be taught to kill cancer?” That story focused on the promise and challenges of immunotherapy.

“Soon after, we had an appointment with our local oncologist to have a port put in so that John could begin chemotherapy,” Iride said. “While we were there, we asked the doctor if there was any doctor or hospital nearby working with

immunotherapy as a cure for bladder cancer.”

After an exhaustive search, their doctor found one trial for John’s rare type of cancer at Fox Chase.

The trial was called KEYNOTE-052 and it investigated the use of pembrolizumab in patients with bladder cancer who were ineligible to receive a typical standard-of-care chemotherapy called cisplatin.

“In order to receive cisplatin, you have to have good kidney function, and with one kidney left, John’s function was not adequate to receive that drug,” said Matthew R. Zibelman, a medical oncologist at Fox Chase who enrolled John in the trial.

The trial would ultimately lead to Food and Drug Administration approval of pembrolizumab for patients like John with locally advanced or metastatic urothelial cancer who could not handle cisplatin. Of the participating patients, about 29 percent saw their disease respond to the treatment, but it is not yet known how long that effect will last.

If John had not enrolled in the trial at Fox Chase, he would have begun chemotherapy that day in June 2016, getting infusions every two to three weeks for as long as it seemed to be controlling his cancer, Zibelman said. If his cancer stopped responding, he would have been switched to a different chemotherapy.

“After first-line treatment, there weren’t clear approved chemotherapy options for patients like John,” Zibelman said. “The chances of benefit of the drugs we used were low, in the 10 percent to 20 percent range, and the average survival was about one year.”

Instead, John received two years of pembrolizumab through the clinical trial and elected to continue treatment for another year after the drug was approved. Now, more than three years from his diagnosis, John’s scans show no evidence of active disease.

TOO GOOD TO BE TRUE?

People like John are among the lucky ones though, Geynisman pointed out. The number of people whose disease will respond to checkpoint inhibitors varies depending on the type of cancer, as well as a variety of other disease and patient characteristics.

“It varies greatly, but I would say on average about a quarter of patients eligible for treatment will respond,” Geynisman said. “It is still only a minority.”

For example, in advanced non-small cell lung cancer, recent data from another trial of pembrolizumab showed that about 23 percent of patients who received no prior treatment responded and were still alive five years after diagnosis.

“In lung cancer, we have never had this type of data for clinical efficacy at five years,” said Hossein Borghaei, a medical oncologist at Fox Chase. In fact, prior to the immunotherapy era, the five-year survival rate for non-small cell lung cancer was closer to five percent.



“IT IS GOING TO TAKE US LONGER TO TRULY BE ABLE TO MANIPULATE THE IMMUNE SYSTEM IN FAVOR OF GETTING RID OF CANCER WITHOUT CAUSING A LOT OF SIDE EFFECTS, BUT EVERYBODY SHOULD STAY TUNED. IT IS GOING TO GET EVEN MORE EXCITING IN THE NEXT FIVE TO 10 YEARS.”

— HOSSEIN BORGHAEI, MEDICAL ONCOLOGIST

But not every type of cancer is responding to immune checkpoint inhibitors the way that lung and urothelial cancers are. There is probably a combination of factors, mainly related to the type of tumor and the particular patient, that affect how well these drugs work.

Despite only a small percentage of patients responding, the reason many researchers are so excited about immune checkpoint inhibitors is that of those patients that do respond, the responses are durable and can last months to years. That is why there is so much research being done to help identify people who will respond and to find ways that may allow more people to respond.

SEARCHING FOR CLUES

Borghaei and colleagues Edna Cukierman and Kerry S. Campbell codirect the Immune Monitoring Facility for Immunotherapy at Fox Chase. Staff at the facility work with scientists and clinicians to perform studies called immune phenotyping on blood, bone marrow, tumor, or lymph node samples taken from patients with cancer.

“We can look at samples taken before treatment, during treatment, and after treatment to see whether a patient’s immune system has been activated,” said Campbell.

For example, in patients assigned to immune checkpoint inhibitors, one thing scientists are trying to figure out is how to identify patients that will respond prior to starting the treatment. “It would also be useful to know if there are immune checkpoint molecules other than CTLA-4 or PD-1/PD-L1 that appear on cells during treatment that can be used as targets for future immunotherapies or combinations of immunotherapies,” Campbell said.

In addition to identifying patients who will respond to immune checkpoint inhibitors, this type of research could also identify those who will not. This information could help clinicians to move patients to more effective therapies sooner in the course of their treatment and spare them any possible side effects of immunotherapy.

TOXICITIES AND COST

The types of side effects that occur with chemotherapy differ from those associated with immune checkpoint inhibitors, but Geynisman stressed that it is important to remember that some side effects, even sometimes fatal side effects, can occur.

“As the immune system gets activated to attack the cancer, it can get confused and attack normal, healthy body parts as well,” Geynisman said. “This can include anything from the skin to the thyroid, to major organs like the lungs or liver.”

In some cases, these immune-related adverse events can be mild and can be managed with only observation or treatments like topical creams for rash.

However, in some patients these side effects can be severe. There have been cases of inflammation of the heart where high-dose steroids and other immunomodulatory drugs had to be administered quickly. Research has also shown that some of these immune-related events can occur months to years after people have stopped taking immunotherapy drugs, so patients who take the drugs need to keep an eye out for such delayed side effects.

Currently available checkpoint inhibitors can have a price tag averaging about \$150,000 a year. The amount a patient pays will vary depending on whether or not they have health insurance and on the type of insurance. “These drugs are extraordinarily expensive,” Geynisman said, emphasizing that cost is a generally underemphasized and understudied question.

John, who elected to stay on pembrolizumab for an additional year after the clinical trial, said his treatment was covered by Medicare and supplementary insurance he had from being a teacher.

Some patients are kept on the drugs indefinitely, Zibelman said. “Because each clinical trial testing these types of drugs was slightly different, no one knows the answer to how long patients need to stay on them.”

Slowly, researchers are beginning to think that when immune checkpoint inhibitors are successful, people can likely try to stop taking them. In cases where people have had to stop immunotherapy treatment because of immune-related side effects, many continued to respond even after treatment was stopped, Zibelman said. “We are only beginning to ask those questions,” he added.

Research on immune checkpoint inhibitors and other immunotherapies is exploding. “We are only just beginning to appreciate the complexity of the immune system and its relationship to tumor progression,” Borghaei said. “It is going to take us longer to truly be able to manipulate the immune system in favor of getting rid of cancer without causing a lot of side effects, but everybody should stay tuned. It is going to get even more exciting in the next five to 10 years.” ♦

The UN Known Patient

Male Breast Cancer Can Be An Isolating Experience

When people hear the words “breast cancer,” they likely envision pink ribbons. Maybe they think about a woman they know who had the disease. Maybe they are “that” woman. Chances are, however, they don’t think about men.

But last year, about 2,700 American men experienced something like what happened to Thomas Spoltore. Right after Christmas in 2017, the then-72-year-old barber was showering when he noticed what he thought was a pimple on the right side of his chest.

He decided to ignore it, figuring it would go away. But as the days and weeks passed, it didn’t. It got bigger. Spoltore’s wife suggested he see his family doctor, who recommended further consultation. Spoltore made an appointment at Fox Chase Cancer Center. A mammogram and ultrasound confirmed he had breast cancer.

“My initial reaction was shock,” Spoltore said. “I truly did think the odds were in my favor and there would not be a cancer diagnosis. It was hard to talk about initially, since I was not aware of anyone I knew with male breast cancer.”

BY ABBEY J. PORTER

PHOTO ILLUSTRATION BY CLINT BLOWERS



While men don't have breasts in the same sense that women do, everyone—male and female—has breast cells and tissue that can become cancerous. Breast cancer in men is relatively rare: Only 1 in 1,000 men will be diagnosed with the disease, versus 130 in 1,000 women. Breast cancer in men usually develops as a hard lump beneath the nipple and areola.

Most cases of breast cancer in men are infiltrating ductal carcinoma, or IDC, in which cells in and around the milk ducts (yes, men also have milk ducts) begin to invade surrounding tissue. Breast cancer carries a higher mortality rate in men than in women, partly because men are less likely to suspect a lump of being cancerous, which can cause a delay in treatment.

That was the case with Spoltore, who waited a month or more before seeing a doctor about the growth on his chest. Once he had been diagnosed, Fox Chase surgical oncologist Allison A. Aggon gave him a choice: have the tumor removed and undergo radiation, or have a mastectomy. Spoltore opted for the mastectomy.

TREATMENT AT A GLANCE

The large number of female breast cancer patients has allowed for extensive study of the disease—and its treatment—in women. However, the disease has not been studied much in men because of the relatively small number of male patients. “Historically, we’ve always extrapolated our experiences with women to treat men,” said Mary Daly, a medical oncologist specializing in genetics. “But there very well could be differences in responses to chemotherapy agents that we really don’t know.”

With that said, treatments for male and female breast cancer patients are generally the same. Many men benefit from a combination of approaches, such as:

SURGERY: Options consist of a mastectomy, in which the entire breast is removed, or breast-conserving surgery, also called a lumpectomy, in which just the tumor is taken out.

RADIATION THERAPY: Patients may have treatment with radioactive rays or particles after surgery to help kill off any cancer cells that were missed. If the cancer is inoperable, radiation may be the primary treatment.

CHEMOTHERAPY: With this treatment, the patient is given drugs, either orally or by injection, that attack the cancer cells. He may have chemotherapy after surgery to lower the risk of the cancer coming back. For men with advanced cancer or cancer that has spread to other parts of the body, chemotherapy may be the primary treatment.

HORMONE THERAPY: Some types of breast cancer need certain hormones to grow. Hormone therapy blocks the effects of those hormones, stopping the growth of the cancer. It's often more successful in men than in women because more men, about 90 percent, have hormone-receptor-positive cancer. For men with advanced cancer, hormone therapy may be the primary treatment.

TARGETED THERAPY: Some men have an excess

“Men and their health care providers need to know that they are at risk for developing breast cancer and they need to be vigilant for new breast symptoms and changes.”

— ALLISON A. AGGON, SURGICAL ONCOLOGIST

of a protein (HER2) that makes cancer spread quickly. Trastuzumab (Herceptin) is one of the drugs that has been approved to treat breast cancer that has spread to other areas of the body. It stops HER2 from making cancer cells grow.

NEW ATTITUDES, NEW OPTIONS

It used to be that male breast cancer patients were nearly always given a mastectomy. But attitudes toward, and options for, the treatment of breast cancer in men have changed in recent years, noted Richard J. Bleicher, a surgical oncologist and leader of the Breast Cancer Program.

The attitude used to be that there was “no value in saving what little breast a man has,” Bleicher said. “Men would wind up with a scar across the chest.” Recently, however, a trend has developed, at Fox Chase and elsewhere, to conserve the breast in male patients.

Bleicher said that when it comes to caring for breast cancer patients, survival is the primary goal. “Regardless of whether you’re male or female, the number one priority is to get rid of the tumor and maximize survival. Number two is to maximize the cosmetic outcome.”

Bleicher said that for male patients, the survival rates for lumpectomy plus radiation or chemotherapy are on par with those for mastectomy. And for many, the former may be preferable. That’s because, generally speaking, men care about what they look like posttreatment.

“Men do have the desire to have a cosmetically less disruptive outcome,” Bleicher said. “Men care if there’s a cosmetic difference, if the nipple and areola are removed.” Although the breast does not hold the same sexual significance for men that it does for women, “there needs to be a recognition that men are cosmetically aware, in many cases, and they also don’t want disfigurement,” he added.

He minimizes cosmetic deformity in his patients using oncoplastic techniques, surgical approaches that combine advanced plastic surgery with surgical oncology. For instance, if a large lumpectomy is required that will leave the breast distorted, the remaining tissue is sculpted to realign the nipple and areola and restore a natural appearance to the breast. The opposite breast is also modified to create symmetry. In the end, it’s often difficult to tell that the patient ever had surgery.



According to surgical oncologist Allison A. Aggon, most breast lumps in men, just like women, end up being benign.

risk. “Say we have a BRCA2 family,” she said. “Men are less likely to think it has relevance to them. But men still need to pursue testing”

One question, Daly noted, is how to effectively screen men known to be at risk for breast cancer. Some can undergo mammograms, but not all have enough breast tissue for the procedure to be feasible.

CATCHING IT EARLY

As with other cancers, early intervention is key when it comes to outcomes for men with breast cancer. For the earliest stages of breast cancer in men, Stages 0 and 1, the five-year survival rate is 100 percent. Five-year survival is 87 percent for men with Stage 2 disease and 75 percent for Stage 3. Stage 4, when the disease has spread to other parts of the body, is 25 percent.

New treatments help many people with breast cancer maintain a good quality of life for some time, even if the cancer is found at a more advanced stage. And it’s important to remember that survival-rate statistics are estimates that do not dictate individual experiences.

Spoltore was fortunate because his cancer was caught early. Nonetheless, if he had it to do again, he would have gone to see a doctor sooner. “I think I was in denial. You don’t hear too much about breast cancer in men,” he said.

“Never assume that a lump is benign,” Bleicher said. “If you have a lump and it persists, get a medical opinion. But don’t just see your doctor—see a breast specialist.” He recommends consulting a specialist with extensive expertise in male breast cancer. Ideally, he said, one should seek care at a National Cancer Institute-designated center like Fox Chase.

“Most breast lumps in men, just like women, end up being benign,” Aggon said. “However, we can never assume. Men and their health care providers need to know that they are at risk for developing breast cancer and they need to be vigilant for new breast symptoms and changes, as these could be symptoms of breast cancer.”

“One should not assume that, ‘I’m a man, I can’t get breast cancer. I’m going to ignore it,’” Bleicher said. Because men do get breast cancer, thousands each year, but the cases are very scattered, so the experience can feel isolating.

Six years ago, after an annual exam discovered a lump in his right breast, 77-year-old Alan Levine underwent a lumpectomy and radiation at Fox Chase. Sometime after, he and his family attended a Susan G. Komen walk to raise breast cancer awareness and money for research. He kept looking around for other men—and not finding them. “I couldn’t find any other man there who had breast cancer,” he said.

Recently, after his annual mammogram revealed cancer on the other side of the same breast, Levine had a mastectomy, followed by chemotherapy. His encounter with breast cancer made an impression on him. “I felt obligated to open up and tell as many people as I could what my experience was,” he said. ♦

INHERITED RISK

Like female breast cancer patients, men with breast cancer need to think beyond the treatment of their disease. They also need to consider whether their genetic makeup put them—and their families—at risk.

“If someone has male breast cancer, they ought to get genetic testing,” said Elias Obeid, a medical oncologist at Fox Chase who studies breast cancer genetics. “There’s more than a 10 percent chance they have a genetic predisposition.”

The strongest known genetic risk factor for breast cancer in men comes from an inherited mutation in the BRCA2 gene. There’s also a slight correlation with the BRCA1 mutation, as well as with other mutations. For male BRCA2 carriers, the lifetime risk of developing breast cancer is 6 percent to 8 percent, whereas women who carry the mutation run a risk of 50 percent to 85 percent. However, male BRCA2 carriers also run a heightened risk of developing melanoma or prostate or pancreatic cancer.

If a man tests positive for BRCA2, his family should be informed, Obeid said. The man’s sons and daughters, for example, would run a 50 percent chance of inheriting the same mutation, putting them at heightened risk for both breast and ovarian cancer.

Knowledge of the genetics behind breast cancer in men is still developing, said Daly. “We know the most about BRCA2,” she said. “Five years from now, we’ll know a lot more.”

Daly founded the Risk Assessment Program at Fox Chase, which helps individuals and families determine their cancer risk through clinical and genetic evaluation and screening. She sees a difference in how men and women perceive their

FAITH TO FALL BACK ON

BY SARAH JAYNE HUGHES

Angela Shammo was a first grade teacher for six years before becoming a reading specialist for kids with learning disabilities. After having four children of her own, she decided to be a stay-at-home mom and teach her children and their cousins.

Angela was with her youngest, who was 18 months at the time, at the mother's group she ran at her church, when she received a heart-wrenching call from her doctor. "Thankfully, I was surrounded by an extremely supportive group of women when I learned I had breast cancer," she said.

Breast cancer was not a significant part of Angela's family history. So, at 40 years old, when she went for what was only her second routine mammogram in December of 2016, she did not think anything would be out of the ordinary.

She had her mammogram done at a local hospital and had to wait six weeks for a biopsy. After the staff notified her of her breast cancer through what she felt was an unfeeling phone call, she decided to come to Fox Chase Cancer Center. She did not want to be treated in such an impersonal way, like a number.

Angela was not unfamiliar with Fox Chase. Her mother-in-law

worked here for 25 years and she has two other family members who are currently employees. "When my husband and I were just dating, we would go to pick up his mother to take her to lunch," she said. So when she wanted a more personalized experience, she knew Fox Chase was where she needed to be.

"At Fox Chase, my breast surgeon, Marcia Boraas, spent over an hour talking, drawing pictures, and really explaining my cancer diagnosis to me in detail," Shammo said. She was told she had Stage 1

but she said one could see me in 10 minutes."

After meeting with the reconstructive surgeon, her surgery was planned for March 2017. She would have a double mastectomy with immediate DIEP flap reconstruction. This surgery involved a tummy tuck procedure in which tissue was removed from her lower abdomen and used to reconstruct her breasts. The combined surgery was 12 hours with an 8- to 12-week recovery period.

Shammo has a scar from hip

"Two major life-changing surgeries within three months! I feel like I got an answered prayer."

— ANGELA SHAMMO, BREAST CANCER SURVIVOR

invasive breast cancer. Her MRI at another hospital was interpreted as a malignant lymph node, but doctors at Fox Chase determined that it was just two lymph nodes stuck together. Both of them were benign.

"My breast surgeon was retiring soon, but she would be able to perform my double mastectomy before then," Shammo said. "She offered to have me see a breast reconstruction surgeon too. I expected it to be on another day, or even week,

to hip from that surgery. "I was grateful that I had enough belly fat for the reconstruction. I wanted to look like me and implants were just not for me," she said. During her recovery she slept in an electric recliner and experienced very little discomfort.

After the surgery, Shammo met with Angela Jain, a medical oncologist who sent the tumor out for an oncotype test to determine the recurrence rate of the cancer.



Angela Shammo

The test showed that the chance of recurrence was one point over low recurrence.

“Dr. Jain said if I were her sister, she would tell me no chemo. She was so down to earth and personal,” said Shammo. “Dr. Jain truly cared about me and my health and well-being.” After getting the advice of her doctors, Shammo decided to opt out of chemotherapy and begin a five- to 10-year course of tamoxifen, the oldest and most-prescribed selective estrogen receptor modulator.

After she received her diagnosis, Shammo started a rosary group at the Nativity of Our Lord parish to pray for the sick. The church is also where she helps run the Saint Gianna Beretta Molla shrine and a monthly mother’s prayer group. Shammo considers those at the church an extension of her own family. Several families from church, as well as her children’s

school, delivered over 50 meals to her while she was going through recovery.

Her husband of almost 20 years juggled everything to take her to doctor appointments and take care of their children. “He would still take the kids to their different activities to keep their lives as normal as possible,” Shammo said. “I had the best support from my family and my church family.”

After her surgery, Shammo had genetic testing done with the help of Mary B. Daly, director of the Risk Assessment Program, and genetic counselor Michelle Savage. They discovered that she was BRCA2 positive, which means her children have a 50 percent chance of being BRCA2 positive as well.

Due to her BRCA2 mutation and the fact that her tumor was one hundred percent estrogen-receptor positive, Shammo made the decision to have prophylactic surgery.

So in June 2017, gynecologic oncologist Gina Mantia-Smaldone removed Shammo’s uterus, cervix, ovaries, and fallopian tubes.

Recovering from her double mastectomy and the reconstructive surgery went smoothly. However, recovering from her prophylactic surgery was more challenging. Shammo was immediately thrown into menopause, and the first two weeks were mentally and physically draining. Once again she was sleeping in her electric recliner. However, after those first two weeks, she was back to her normal, happy self.

Shammo comes back to Fox Chase every six months to see her oncologist, gynecologic oncologist, and breast surgeon. “I used to cry if I had the stomach bug, but I did this,” she said. “Two major life-changing surgeries within three months! I feel like I got an answered prayer.”

A FAMILY OF PHYSICIANS

BY SARAH JAYNE HUGHES

Growing up in Wrocław, Poland, as the child of two physicians, Mariusz Wasik always knew he wanted to work in science or medicine.

“I grew up in this atmosphere, and what I appreciated more in medicine is not only what we know, but what we do not know. That is why I leaned toward science,” said Wasik, who chairs the Department of Pathology and is associate director of the Cancer Center.

Wasik’s lab focuses on the origin and development of lymphoma. “I am a firm believer that the biology of the disease should define both diagnostic and therapeutic approaches to patients with lymphoma and cancer in general,” said Wasik, who is also the Donald E. & Shirley C. Morel, Stanley and Stella Bayster Chair in Molecular Diagnostics.

Wasik earned his medical degree *magna cum laude* from Wrocław Medical University, and that is where he met his wife, Maria Werner-Wasik, who was a medical student in the same class. They married and moved to the United States in 1983. His wife is now an endowed professor of radiation oncology and vice-chair of that department at Thomas Jefferson University.

After graduating from medical

school, Wasik worked as an immunologist, a track he decided to continue once he came to America. “At one point in my training, I realized that connecting basic research with a practical clinical approach would be a good combination,” he said. “I started studying not so much focusing on how the immune system works, but on what is wrong

he was the scientific leader of the Translational Center of Excellence for Lymphoma at Penn’s Abramson Cancer Center.

His responsibilities at Fox Chase include playing a prominent role in faculty recruitment and retention, and strengthening the portfolio of molecular diagnostics and genomic testing. Another focus is developing

“My ambition has always been to understand how patients develop cancer, with the premise that when you understand its underlying mechanisms, you can be much more effective in terms of bringing relief to patients.”

— MARIUSZ WASIK, CHAIR OF PATHOLOGY, FOX CHASE CANCER CENTER

with the immune lymphocytes that they become malignant.”

Wasik came to Fox Chase in July of 2018 from the University of Pennsylvania, where he was a professor and served in various positions in pathology and laboratory medicine, including director of experimental hematology, director of the hematopathology fellowship training program, and director of hematopathology. Most recently

a comprehensive genomic evaluation of the cancers in individual patients, with the ultimate goal of identifying therapeutic targets for their malignancies.

His research focuses on aberrant cell signaling in lymphomas, the underlying genetic and epigenetic mechanisms, the development of the related new diagnostic and therapy monitoring approaches, and the identification of novel therapies



Mariusz Wasik

based on the unique biology of malignant cells.

Wasik said he was drawn to Fox Chase because of the atmosphere. “The people are devoted to what they do. It is a cooperative spirit overall.” In his short time here, he has already started collaborations with other labs, including one with researcher James S. Duncan, an assistant professor, whose lab has developed a test that allows detection of signaling pathways that are activated in various types of cells.

“We are working with him on that because the activated pathways may generate insights into the mechanisms of malignant cell transformation as well as provide guidance to how the cells can be therapeutically targeted.”

When he is not in the lab or the

clinic, Wasik enjoys spending time with his two daughters and two grandchildren. One daughter practices law in Washington and the other is a nurse practitioner in Philadelphia.

He said that although they are still very young, his grandchildren are already showing signs of intellectual curiosity. “At only three years old, my grandson started asking tough questions. He asked, and I’m quoting, ‘Why are only females able to give birth and feed the babies?’”

In addition to spending time with his family, Wasik enjoys outdoor activities like skiing, biking, and swimming. He also enjoys seeing movies with his wife, but not “the blockbusters.”

In the end, it all comes back to

his work. “My ambition has always been to understand how patients develop cancer, with the premise that when you understand its underlying mechanisms, you can be much more effective in terms of bringing relief to patients,” he said.

Wasik believes that the development of new technologies and the information they yield make these exciting times in science and medicine. He appreciates all the work of the faculty and students at Fox Chase and the breakthroughs that have come from that effort, such as the discovery of the Philadelphia Chromosome.

“One could argue that life philosophy or work philosophy is based on our experiences,” he said. “They do not come from nowhere and shape us in multiple ways.”

FEET FIRST TO KICK CANCER

Over the last 11 years, the Kicking Cancer Foundation has raised \$375,000 for cancer research

BY LISA BROIDA BAILEY

In 2009, Jen Scullin felt compelled to do something about curing cancer. No, she wasn't a cancer researcher or even a doctor. She was an athlete and a friend to five people who were confronting cancer. Rather than responding to these loved ones with, "I'm sorry to hear that," she wanted to say, "I'm going to stop this disease."

An avid basketball, kickball, and soccer enthusiast, Jen decided to organize a fundraising kickball tournament in August 2009 at Franklin D. Roosevelt Park in South Philadelphia. She recruited co-founder Trish Noel, and the nonprofit Kicking Cancer Foundation was born. Since its inception, the Kicking Cancer Foundation has raised \$375,000, most of which has supported cancer research efforts at Fox Chase Cancer Center.

The organization's mission statement says it all: "To raise money for cancer research. We aspire to bring hope to those fighting cancer, offer support to those who have family or friends suffering from the disease, and, lastly, share our compassion with those who have lost loved ones."

In its second year, the Kicking



Funds raised by the Kicking Cancer Foundation go to the Immersion Science Program at Fox Chase, which enables students to participate in a hands-on cancer research program. Participating students are shown here at the Classroom Research Symposium held at the Franklin Institute.

Cancer Foundation board made the unanimous decision to direct all of their philanthropic efforts to Fox Chase. In recent years, they have focused their support on the Immersion Science Program (ISP). Alana M. O'Reilly, the program's scientific director, and Dara Ruiz-Whalen, its education director, spearhead the ISP, which enables students to participate in a hands-on cancer research program.

"Support from Kicking Cancer

Foundation enables the participants to transition from high school students to professional scientists, presenting their cancer research at a conference at the Franklin Institute," O'Reilly said. "We are extremely grateful to all of their supporters for their dedication to research."

Three ISP programs have a competitive selection process, and students who are accepted are given the opportunity to conduct cutting-edge cancer research that has



Left: A participant at the Kicking Cancer event held at Fairmount Park in Philadelphia winds up for a kick. **Above:** Pictured at the most recent Kicking Cancer event are members of the organization’s board: Eric Kukieza, secretary; Taylor Roye, treasurer; and Steve Chaya, president.

the potential to help patients. ISP consists of five primary programs: research at Fox Chase, the Summer Fellows Program, Fly Lab @ Esperanza College, Immersion Essentials, and the In-Classroom Program.

“Kicking Cancer Foundation and Immersion Science at Fox Chase are a perfect match. Both focus on engaging youth to support cancer research,” said Steve Chaya, president of the Kicking Cancer board.

At the kickball tournament that helps raise money for programs like ISP, Fox Chase is represented on and off the field, both as the beneficiary and by teams that represent the institution. “Participating with teams in Kicking Cancer allows our employees to bond with each other outside of work, compete in a fun-filled

popularity for more than a decade.

Young professionals throughout Philadelphia have formed teams and participate every year. By day, Ajinkya “Jinx” Joglekar is an executive director of e-commerce at Comcast. But in his spare time, he enjoys kickball with his teammates. “We play to have fun. Let’s say we’re the Bad News Bears on the field, but

“Kicking Cancer Foundation and Immersion Science at Fox Chase are a perfect match. Both focus on engaging youth to support cancer research.”

— STEVE CHAYA, PRESIDENT, KICKING CANCER BOARD

day of kickball, and, most importantly, demonstrate support to our community fundraisers, who put enormous effort into fundraising events,” said Shawn P. Kleitz, chief development officer at Fox Chase.

In addition to its signature event, Kicking Cancer hosts several fundraising activities. The foundation quickly became known for their kickball tournament, which has grown in size and

at least we win on the fundraising circuit.” Joglekar earned the top prize for fundraising in 2019 by pulling in \$3,150.

In August 2020, the foundation will host the 12th Annual Philly Kicking Cancer tournament and will likely surpass the \$400,000 mark in their fundraising efforts to date for cancer research. To learn more, visit www.kickingcancerfoundation.org.

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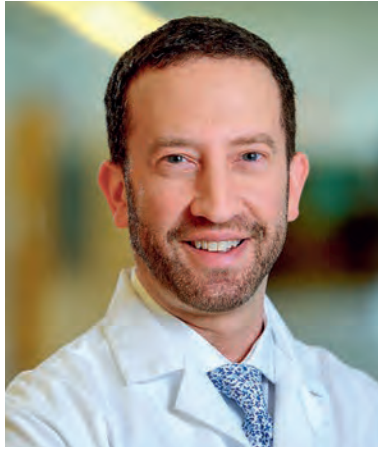
BLEICHER RECEIVES BREAST CANCER AWARD

Surgical oncologist Richard J. Bleicher was recently awarded the 2020 Jamie Brooke Lieberman Remembrance Award from Susan G. Komen Philadelphia for his work in the breast cancer community.

The award's namesake, Jamie Brooke Lieberman, lost her battle with inflammatory breast cancer in 2012 at the age of 35. She fought for understanding and awareness of her disease and was active in raising funds for research and community outreach, early detection, and treatment programs.

"I'm humbled to be honored with this award in memory of Jamie Lieberman and the important struggle she fought for," Bleicher said. "It has always been my privilege to work on behalf of tens of thousands of women faced with this disease in the hope we can make a difference and develop a cure."

"Jamie valued every life tremendously and equally," Elaine I.



Richard J. Bleicher

Grobman, Komen Philadelphia's chief executive officer, and Jamie's parents, Jules and Carole Lieberman of the Inflammatory Breast Cancer Foundation, wrote in a letter to Bleicher. "She was determined to conquer breast cancer in her lifetime and she made it her personal mission to ensure every woman of today and tomorrow would have the best fighting chance if faced with a diagnosis."

FOX CHASE LAUNCHES NEW EMPLOYEE CANCER SCREENING INITIATIVE

According to the American Cancer Society, cancer screenings have the potential to prevent thousands of cancer cases and deaths in the United States. Detecting cancer early, when there is the best chance for successful treatment, is something everyone at Fox Chase knows the importance of.

To make cancer screening more convenient for staff, Fox Chase kicked off its Employee Cancer Screening Initiative in October. The program focuses on providing education and screening for a variety of cancers to all eligible staff members.

"While cancer education and screening are mainstays of our community-based efforts, we also recognize the importance of focusing our attention right here within our institution," said Richard I. Fisher, president and CEO of Fox Chase.

Approximately once a month, the program highlights a different cancer type and raises awareness about its risk factors and screening methods through educational sessions led by nurse navigators and advanced practice clinicians, and an online portal.

CONNOLLY HONORED FOR OVARIAN CANCER RESEARCH

Denise Connolly, an associate professor in the Molecular Therapeutics Program at Fox Chase Cancer Center, has won the Sandy Rollman Ovarian Cancer Foundation's Teal Trailblazer Award. Connolly is currently researching a subtype of ovarian cancer, high-grade serous carcinoma, in mouse models to understand why not all ovarian cancer arises in the ovary.

"Some ovarian cancer arises outside of the ovary and travels to the ovary," she said. "When the patient is diagnosed, it looks like the ovaries are the main site of involvement. We want to know why the tumor in the fallopian tubes travels to the ovary and establishes itself more prominently there in high-grade serous carcinoma using mouse models."

Another project Connolly is working on is how a specific tool antibody may be developed into a therapeutic drug to kill ovarian cancer cells.

"Ovarian cancer cells shed from the primary tumor and they rely on adhesion molecules to keep them attached to each other so they can survive," Connolly said. "If we treat with the tool antibodies, the antibodies bind to the adhesion molecules and block their function. The clusters of tumor cells then fall apart and die."

The Rollman Foundation provides grants to both national and local organizations for ovarian cancer research every year. The foundation has awarded ovarian cancer research grants to Fox Chase for 20 years and has funded more than \$4.4 million in ovarian cancer research.

FOX CHASE BUCKINGHAM CELEBRATES 10TH ANNIVERSARY

In September, Fox Chase Cancer Center–Buckingham celebrated 10 years of providing world-class cancer care to residents of Bucks County. The advanced radiation therapy facility opened in July 2009 to bring the resources of a National Cancer Institute-designated comprehensive cancer center closer to home.

“I commend Dr. Hayes and her team for their outstanding work over the last 10 years. When Fox Chase Buckingham opened, it represented a new concept as the first satellite location for Fox Chase Cancer Center. There was a real drive to make it successful, and it is evident that our team here has far surpassed expectations.”

— RICHARD I. FISHER,
PRESIDENT AND CEO OF
FOX CHASE CANCER CENTER

Buckingham was the first in Bucks County to offer the CyberKnife Robotic Radiosurgery System, the first system of its kind to offer a painless, nonsurgical option for targeting both intracranial and extracranial tumors with submillimeter accuracy. Since the opening of the center, more than 1,100 patients have benefited. From the start, patients at Buckingham have also had access to the same clinical trials for radiation therapy available at Fox Chase’s main campus.



Fox Chase President and CEO Richard I. Fisher and Shelly Hayes, director of Fox Chase Buckingham, celebrate the 10th anniversary of the center’s opening.

Under the capable direction of Shelly Hayes, MD, Fox Chase Buckingham has grown significantly in its 10 years to offer onsite surgical consultations by a Fox Chase gynecologic oncologist, as well as genetic counseling and testing through the Risk Assessment Program.

In addition to excellent patient care, Buckingham also offers training opportunities to resident physicians. Most radiation oncology residents choose to do an elective rotation at Fox Chase Buckingham to gain a community-based perspective similar to private practice.

“I commend Dr. Hayes and her team for their outstanding work over the last 10 years,” said Richard I. Fisher, president and CEO of Fox Chase. “When Fox Chase Buckingham opened, it represented a new concept as the first satellite location for Fox Chase Cancer Center. There was a real drive to make it successful, and it is evident that our team here has far surpassed expectations.”



Jaye Gardiner has been selected as one of 125 IF/THEN Ambassadors for the American Association

for the Advancement of Science. The program, an initiative of Lyda Hill Philanthropies, seeks to further women in science, technology, engineering, and math.



Elizabeth Plimack has been elected to the American Society of Clinical Oncology Board of Directors for a term

of four years. She will begin her appointment in June 2020.



Anne Jadwin was honored with the 2019 Distinguished Alumni Award from Gwynedd Mercy University, where

she received her Master of Science in Nursing in 1990. The award recognizes the achievements of outstanding alumni whose “personal lives, professional achievements, and community service exemplify the objectives of their alma mater.”



Marcin Chwistek has been appointed Editor-in-Chief of *AAHPM Quarterly*, which is published by the American

Academy of Hospice and Palliative Medicine. Chwistek will work with other members of the editorial board to stay on top of current trends in the field of hospice and palliative medicine.



Sergei Grivennikov was named as one of 2019’s highly cited researchers by the Web of Science Group, considered to be

the world’s largest publisher-neutral citation index and research intelligence platform. Their annual report analyzes the influence of researchers among their peers by analyzing citations across its worldwide, multidisciplinary database.

20TH ANNIVERSARY OF PAWS FOR THE CAUSE

A record attendance of more than 400 guests and their dogs helped raise approximately \$150,000 for cancer research at the 20th Annual Paws for the Cause on October 6, 2019. FOX 29 meteorologist Sue Serio and her rescue dog, Rufus, emceed the event. Fox Chase breast cancer survivor Lori Giampaolo served as patient ambassador.

Physician ambassador Sameer Patel, associate professor of surgical oncology, walked with his dog

Monte. The title sponsor for the event was West Pharmaceutical Services Inc.

Paws for the Cause has raised more than \$600,000 for research at Fox Chase.

Giampaolo credited her treatment team, family, and friends for helping her get through a difficult journey. As a former participant in Paws for the Cause, she said she was excited to be involved in such a meaningful way to support cancer research and bond with fellow cancer survivors.



Team Giampaolo at the 20th Annual Paws for the Cause fundraiser held on the Fox Chase campus.

ERICA GOLEMIS NAMED 2019 AAAS FELLOW

Erica Golemis, professor, deputy chief science officer, and leader of the Molecular Therapeutics Program at Fox Chase Cancer Center, has been named a 2019 Fellow of the American Association for the Advancement of Science (AAAS).

“I am honored and delighted to be nominated as an AAAS Fellow, as this will enhance my ability to be an advocate for basic science,” said Golemis.

Golemis was nominated as a Fellow for her work on the cell cilium, which has been described as the “antenna” of a cell. Besides roles in cancer, defects in signaling at cilia can lead to serious inherited conditions such as polycystic kidney disease, among others.

“In some types of tumor, cancer cells send out signals to normal cells in the microenvironment, changing it to enhance tumor growth. Some of these signals are transmitted through cilia on the normal cells,” she said.

FOX CHASE-TEMPLE BONE MARROW TRANSPLANT PROGRAM RECOGNIZED FOR EXCELLENCE

The Fox Chase-Temple University Hospital Bone Marrow Transplant Program has been recognized for performing better than expected for successful transplant procedures, according to a recent analysis. Fox Chase was the only adult center in the tristate area to achieve this distinction.

In a review performed by the Center for International Blood & Marrow Transplant Research, of the 180 transplant centers in the United States, only 12 adult and five pediatric centers were rated as performing above expectations.

“We manage our patients together and this contributes significantly to the superior outcomes,” said Henry Fung, director of the transplant program. “Our patient survivals compared favorably to most transplant centers across the country.”

Started in 1990, the Fox Chase-Temple BMT program performs over 100 blood and bone marrow transplants a year, procedures that improve long-term outcomes for patients with blood-related disorders and blood cancer.

The state-of-the-art facility at Jeanes Hospital, which is adjacent to Fox Chase, allows Fung and his multidisciplinary team to provide excellent comprehensive care throughout treatment. Physicians and nurses are specially trained in blood and bone marrow transplantation procedures and can provide an array of treatment options tailored to each patient.

PHOTO COURTESY OF FOX CHASE CANCER CENTER INSTITUTIONAL ADVANCEMENT



Linda Hammell accepting The Laurel Society Award on behalf of the Board of Associates of Fox Chase Cancer Center from Fox Chase President and CEO Richard I. Fisher.

LAUREL SOCIETY HOLDS ANNUAL DONOR RECOGNITION DINNER

On October 17, 2019, Fox Chase hosted 200 of its most loyal supporters as The Laurel Society Award was presented to the Board of Associates of Fox Chase Cancer Center, which has raised more

“Historically, this award has been presented to individuals, but this year is different. These individuals who belong to this group have demonstrated an outstanding level of dedication to Fox Chase through giving of their time and talents in the service of advancing or embodying Fox Chase’s mission and values.”

— RICHARD I. FISHER,
PRESIDENT AND CEO OF
FOX CHASE CANCER CENTER

than \$23 million since it began more than 50 years ago.

Linda Hammell, president of the Friends of Fox Chase Cancer Center chapter and director of community cancer screening, accepted the award on behalf of the Board of Associates.

“Historically, this award has been presented to individuals, but this year is different,” said Richard I. Fisher, president and CEO of Fox Chase. “These individuals who belong to this group have demonstrated an outstanding level of dedication to Fox Chase through giving of their time and talents in the service of advancing or embodying Fox Chase’s mission and values.”

The Board of Associates carefully selects the recipients of their funding, ranging from research projects and diagnostic equipment, to patient comfort items and employee scholarships. The awards event also featured one of Fisher’s patients, Brian Kozera, a Stage 4 Hodgkin’s lymphoma survivor, who shared his journey of resilience.

GITLIN FAMILY SURGERY WORKROOM OPENS

In the fall of 2019, a new workspace was opened to serve attending physicians, fellows, and residents of Fox Chase Cancer Center. The Gitlin Family Surgery Workroom was funded by philanthropist Harvey Gitlin in response to a need for a collaborative workspace.

The new space, with secure badge-only access, boasts numerous features, including 34 workstations with dual monitors, an operating room monitor with live patient-surgeon status, a kitchenette, an on-call room with a bed for overnight staff, dedicated lockers, and a lounge area with comfortable furniture.

It is located adjacent to the Marian and Emma Brungard Family Surgical Waiting Suite and its two private consultation rooms, and is just one level above the operating suite.



The newly opened Gitlin Family Surgery Workroom has 34 workstations with dual monitors, as well as a lounge area and dedicated lockers.

“We’ve found it to be a great place to coordinate patient care and optimize interdepartmental communication,” said Laura McGarry, a resident. “The space has also been used for presentations and learning experiences between the fellows and residents.”

HUGH CREECH: A FOX CHASE FAMILY STORY

BY SARAH JAYNE HUGHES

After coming to Fox Chase Cancer Center, which was then the Institute for Cancer Research, in 1945, organic chemist Hugh John Creech would have a long, distinguished career in pioneering work developing and testing chemotherapy drugs.

Even though he was only 35 at the time, the drive of Creech had already resulted in a successful scientific career. After receiving his doctorate in 1938, he synthesized the first fluorescent antibodies, which are now used extensively in the clinical diagnosis of disease, during a postdoctoral fellowship at Harvard.

“My father’s legacy is his work ethic, his humility, and his devotion to science, which he instilled in his family and colleagues,” said his son, Richard H. Creech, a medical oncologist who specialized in breast cancer at Fox Chase and later at Jeanes Hospital.

Two years after coming to Fox Chase, Hugh Creech became the chair of the Division of Chemotherapy, a position he held until 1970. Creech and Timothy Talbot, the center’s president, witnessed the signing of the historic National Cancer Act of 1971 by President Richard Nixon.

“This bill was designed to strengthen the existing cancer centers, to establish 15 new centers, and to reestablish the cancer control program,” said Richard Creech. Fox Chase became established as a

comprehensive cancer center as a result of this act.

Hugh Creech was born in 1910 in Exeter, Ontario. He studied honors chemistry at the University of Western Ontario and obtained his doctorate from the Banting Institute of the University of Toronto. While at Banting, Creech met his future wife, E. Marie Hearne, a postdoctoral student who was researching carcinogens in tissue culture. Creech’s chemical research was

Peter Nowell, had discovered the Philadelphia chromosome, the first conclusive evidence that cancer is a genetic disorder of somatic cells.

From 1941 through 1945, Creech was an assistant and then an associate professor at the University of Maryland in the office of scientific research and development, where he synthesized many antimalarial compounds.

Aside from research, Hugh Creech was an active member of the American Association for Cancer

“My father’s legacy is his work ethic, his humility, and his devotion to science, which he instilled in his family and colleagues.”

— RICHARD H. CREECH, SON OF HUGH CREECH

extremely helpful to her, and after collaborating in the lab, they married in 1937.

“Hugh was the only chemist who could produce the chemicals I needed for my work, and the only way I could make certain of my supply was to marry the guy,” Richard Creech remembers his mother joking. Marie worked part-time in embryology research at Fox Chase between 1949 and 1955, studying chromosome disruption caused by her husband’s carcinogen-protein conjugates.

In later years, Richard’s wife Charlotte worked in the lab of David Hungerford, who along with

Research (AACR). Creech held the position of secretary/treasurer for 25 years, a role in which he was chief administrator for the organization and its journal, *Cancer Research*. He was subsequently elected vice president, president, and archivist of the AACR.

“In April of 1999, at the 90th Annual Meeting in Philadelphia, the AACR presented my father with a special citation gratefully acknowledging his extraordinary research, dedication, and service to the association and the cancer community toward the conquest of cancer,” said Richard Creech. Hugh Creech died on January 18, 2003.



Hugh Creech (top left) shown in the early days of Fox Chase Cancer Center, when it was known as the Institute for Cancer Research (ICR). Shown from left are pioneering geneticist Jack Schultz, ICR co-founder Stanley Reimann, and organic chemist Gerrit Toennies.



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