



Building Bridges

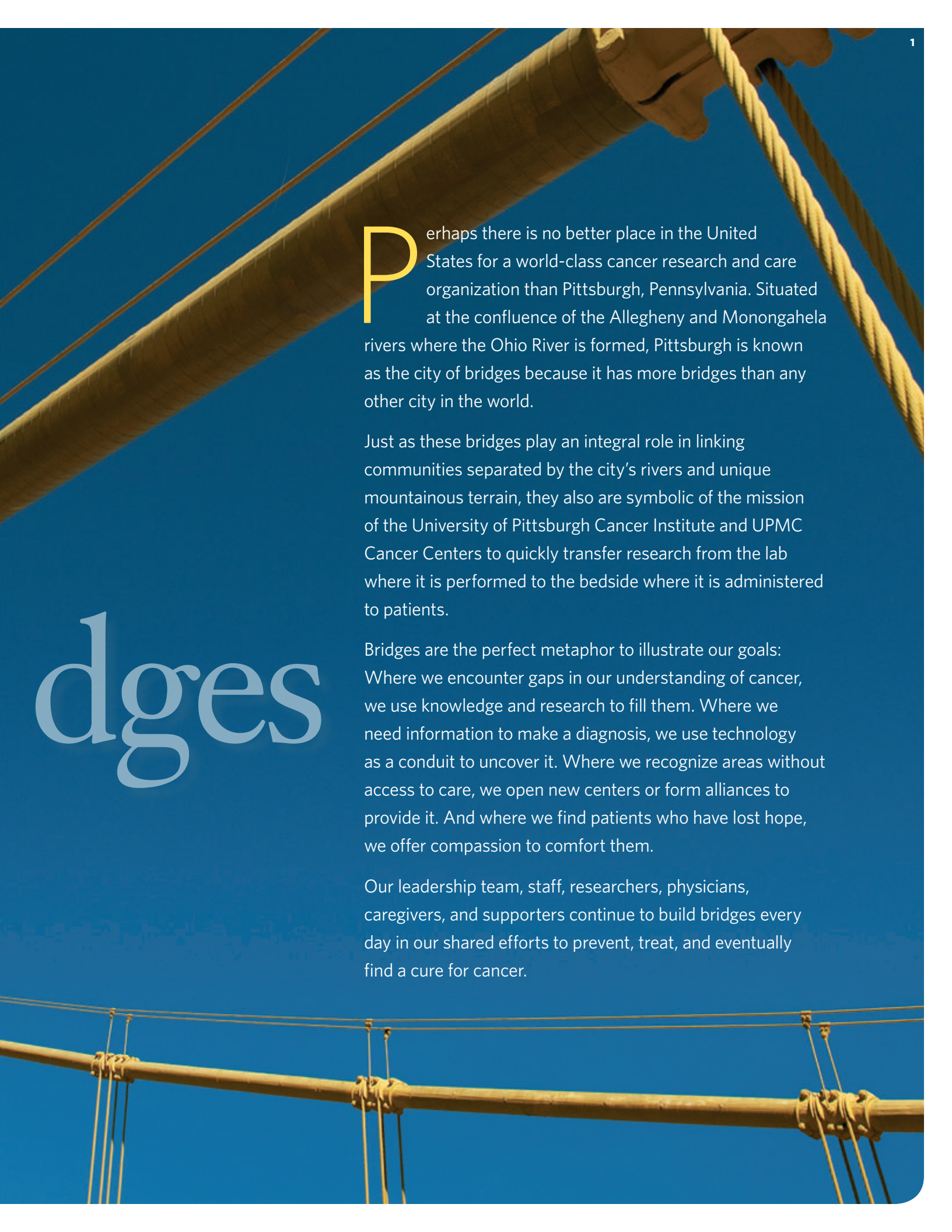
2010 CANCER REPORT

UPMC Cancer Centers *and*
University of Pittsburgh Cancer Institute



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Building Bri



Perhaps there is no better place in the United States for a world-class cancer research and care organization than Pittsburgh, Pennsylvania. Situated at the confluence of the Allegheny and Monongahela rivers where the Ohio River is formed, Pittsburgh is known as the city of bridges because it has more bridges than any other city in the world.

Just as these bridges play an integral role in linking communities separated by the city's rivers and unique mountainous terrain, they also are symbolic of the mission of the University of Pittsburgh Cancer Institute and UPMC Cancer Centers to quickly transfer research from the lab where it is performed to the bedside where it is administered to patients.

Bridges are the perfect metaphor to illustrate our goals: Where we encounter gaps in our understanding of cancer, we use knowledge and research to fill them. Where we need information to make a diagnosis, we use technology as a conduit to uncover it. Where we recognize areas without access to care, we open new centers or form alliances to provide it. And where we find patients who have lost hope, we offer compassion to comfort them.

Our leadership team, staff, researchers, physicians, caregivers, and supporters continue to build bridges every day in our shared efforts to prevent, treat, and eventually find a cure for cancer.

dges

Leadership Message

2010 represented a major milestone for the University of Pittsburgh Cancer Institute (UPCI) as we celebrated our 25th anniversary. UPCI grew from humble beginnings in 1985 and later paired with UPMC Cancer Centers to form one of the nation's leading cancer research and care centers.

Nationally, 2011 marks 40 years since President Richard Nixon signed the National Cancer Act declaring war on cancer. Since 1971, the landscape of cancer care has changed dramatically. Thanks to significant advances in the understanding, diagnosis, and treatment of cancer, people are living longer; we are able to better manage side effects; and the disease is being diagnosed earlier, when treatment may be more effective.

A Year of Accomplishments

2010 proved to be more than just an opportunity to cut cake and celebrate UPCI's 25th anniversary. We secured a major grant renewal, added several key members to our leadership teams, and announced some exciting new initiatives.

The most significant of our accomplishments was the five-year renewal of our cancer center support grant from the National Cancer Institute, which continues our designation as a national Comprehensive Cancer Center.

The renewal of this \$27 million grant provides critical infrastructure to support our broad range of clinical, research, and educational programs that are the foundation of our mission to lessen the burden of cancer for people throughout western Pennsylvania and beyond.

This grant is a national benchmark, and one that confirms the exceptional cancer research and care that is taking place right here in Pittsburgh. It also provides a compelling validation of our

efforts, and makes it easier for us to attract top talent from around the world.

Among the leaders who joined us this past year are four individuals who bring unique skills to an already deep team of highly skilled physicians and scientists at UPCI and UPMC Cancer Centers. **Edward Chu, MD**, an internationally renowned expert in the biology and treatment of colon cancer, arrived to serve as chief of the Division of Hematology-Oncology in the Department of Medicine, as well as UPCI's deputy director. We also welcomed **Clayton A. Smith, MD**, an expert in leukemia and stem cell transplant, as the leader of UPCI's Hematologic Malignancies Program and as director of the leukemia and stem cell transplant clinical services.

In addition, we expanded our expertise in the science of breast cancer by recruiting **Adrian V. Lee, PhD**, a renowned expert in the molecular and cellular biology of breast cancer, as the codirector of the newly formed Women's Cancer Research Center (WCRC) at UPCI and Magee-Womens Research Institute. **Steffi Oesterreich, PhD**, an expert in estrogen receptor biology and action, will serve as the director of education for the WCRC.

Investing in Our Communities

On the clinical side, we were extremely excited to announce plans for the soon-to-be-established Mario Lemieux Center for Blood Diseases at Hillman Cancer Center. Thanks in part to a \$3 million gift from the Mario Lemieux Foundation,TM the new center will be the focal point for comprehensive care and treatment of blood diseases in western Pennsylvania.

In addition, we made several investments to further enhance the quality-of-care available throughout our network of UPMC Cancer Centers locations. We opened a new radiation oncology center, complete with some of the most advanced technology available, at UPMC Cancer Center

at UPMC Horizon. We also added a second linear accelerator at UPMC St. Margaret and upgraded our linear accelerator capabilities at UPMC/Jameson Cancer Center. We consolidated our medical and radiation oncology services into a new cancer center at UPMC Passavant's state-of-the-art clinical tower, which also provided for expanded surgical oncology services.

Finally, we became one of a select few cancer centers in the country to bring a TrueBeam™ STx linear accelerator on line at our Mary Hillman Jennings Radiation Oncology Center at UPMC Shadyside. The revolutionary and versatile TrueBeam system can be used for all forms of advanced external-beam radiotherapy and radiosurgery, delivering treatments in less than half the time, to increase patient comfort, and improve precision of dose delivery to the tumor. It is the crown jewel of an extraordinary arsenal of advanced cancer-fighting technology, which includes RapidArc®, image-guided radiotherapy (IGRT), intensity-modulated radiation therapy (IMRT), gating, Gamma Knife®, CyberKnife®, and more.

Our radiosurgery team celebrated its own milestone in 2009 by performing its 10,000th Gamma Knife procedure and we learned in 2010 that we have performed more of these procedures than any other cancer center in the country. Gamma Knife radiosurgery was pioneered at UPMC in 1987 and is used to destroy deep-seated brain tumors that were once considered inoperable.

Getting Personal With Patient Care

At UPCI and UPMC Cancer Centers, we have never been more committed to advancing the fight against cancer through translational research that allows us to move discoveries from the bench to the bedside in an expedited fashion. We are also focused on delivering patient care with a continuing emphasis on quality and compassion through our extensive, community-based clinical network.



We balance these local missions with the understanding that we must join our scientific and clinical partners around the globe to continue to advance the understanding of cancer and improve methods for preventing, detecting, and diagnosing this formidable disease. We also must formulate novel, lifesaving approaches for treating cancer and seek to further the education of future generations of scientists and clinicians as we all work toward a common goal of creating a future without cancer.

That's a milestone that will be truly worthy of celebration.

NANCY E. DAVIDSON, MD

Director, University of Pittsburgh Cancer Institute and UPMC Cancer Centers

Associate Vice Chancellor for Cancer Research and Hillman Professor of Oncology

Professor of Medicine and Pharmacology and Chemical Biology, University of Pittsburgh School of Medicine

STANLEY M. MARKS, MD

Director, Clinical Services and Chief Medical Officer, UPMC Cancer Centers

Chief, Division of Hematology and Oncology, UPMC Shadyside

Clinical Professor of Medicine, University of Pittsburgh School of Medicine

25

YEARS
of BRIDGING
RESEARCH &
CANCER CARE



Preparing the Path

Building a World-class Cancer Care Center in Pittsburgh

For more than 25 years, the University of Pittsburgh Cancer Institute (UPCI) and UPMC Cancer Centers have been inextricably linked in a common mission to provide the highest level of clinical care to the 30,000 patients treated at its facilities each year. In keeping with that mission is the commitment to translating cutting-edge cancer research from the bench where hypotheses are tested to the bedside where treatment can be administered to patients. This combination of research and clinical care has nurtured an extraordinary partnership which is changing the path of cancer medicine every day.

UPCI is the focal point of all cancer-related academic and research activities associated with UPMC and the University of Pittsburgh. With research faculty members specializing in disciplines ranging from basic laboratory science to cancer prevention, early detection, novel therapeutic discovery, survivorship, and end-of-life care, UPCI maintains a broad strategic vision and comprehensive approach to understanding and defeating cancer.

A 1982 feasibility study for forming a cancer care consortium among the University of Pittsburgh, Carnegie Mellon University, and the six University of Pittsburgh-affiliated hospitals resulted in a report acknowledging the substantial federally sponsored cancer research and outstanding facilities for cancer care that already existed among the collaborators. An agreement of the partner organizations to provide five years of financial support, and a \$3 million grant from the Richard King Mellon Foundation in 1984, provided start-up funds for the Pittsburgh Cancer Institute, now called UPCI.



Ronald B. Herberman, MD, was the founding director of the University of Pittsburgh Cancer Institute and served in that capacity until 2009.

1984

Richard King Mellon Foundation awards a major grant for startup funds for Pittsburgh Cancer Institute, now called the University of Pittsburgh Cancer Institute. ►



Richard
King
Mellon
Foundation

Used with permission from Richard King Mellon Foundation.

1985

Ronald B. Herberman, MD, is recruited to serve as founding director of the University of Pittsburgh Cancer Institute.

1986

First researchers are recruited, laboratories are formed, and experimental research begins at UPCI. ▼

1987

UPCI Council is created, drawing its members from Pittsburgh's top business and civic leaders.



We are western Pennsylvania's only National Cancer Institute-designated Comprehensive Cancer Center, which denotes that our cancer center has not only wide-ranging laboratory, clinical, and population-based research, but also transdisciplinary research that bridges all of these scientific areas.



In the early years, UPCI researchers were located at this small building on Forbes Avenue in Oakland, while administrators were housed several blocks away at Eye and Ear Hospital.

Recognizing the need for an organizational structure to integrate its diverse activities and apply research advances to the diagnosis, treatment, and prevention of cancer, UPCI began a nationwide search for its first director, which culminated in the recruitment of **Ronald B. Herberman, MD**, from the National Cancer Institute (NCI), in 1985. Dr. Herberman's arrival ushered in a period of extraordinary growth, and pledges of \$1.4 million in annual subsidies per member institution, and a \$1.5 million award from the Benedum Foundation, helped to establish a radiation oncology research program.

In 1989, the Mellon Foundation provided an additional \$8 million for cancer programs and the construction of dedicated cancer laboratory facilities within the University of Pittsburgh's 88,000-square-foot Biomedical Science Tower. Later that year, UPCI applied for recognition as a National Cancer Institute-designated Comprehensive Cancer Center, which it received in 1990 — a rare distinction for a program

established only four years earlier and one that UPCI continues to hold to this day.

The next decade saw a trend of consolidation within the health care industry, and Pittsburgh-area hospitals followed suit with the integration of a number of independent hospitals to form the University of Pittsburgh Medical Center, now known as UPMC. Of particular importance to the cancer program was UPMC's 1997 merger with Shadyside Hospital, then an outstanding community hospital with a strong cancer program, located about 1.5 miles from the main University of Pittsburgh and UPMC campus in the Oakland section of Pittsburgh. With this addition, UPCI's leadership decided to develop the Shadyside campus as a center of excellence for cancer.

In 1995, UPMC acquired a 15-physician medical oncology practice known as Hematology Oncology Associates (HOA), which included **Ronald Stoller, MD**, **Samuel Jacobs, MD**, and **Louis Pietragallo, MD**.

In 1999, a transformational gift to the Shadyside Hospital Foundation totaling

1987

UPCI researchers develop new technology for production of "activated natural killer cells," and are the first to use these cells in treating patients with advanced melanoma and kidney cancer.

1990

National Cancer Institute designates UPCI as a **Comprehensive Cancer Center**. ▼



1992

UPCI is one of the first two centers in the United States to receive authorization to conduct gene therapy clinical trials for cancer.

1992

UPCI moves from offices in UPMC's Falk Clinic to a suite in UPMC Montefiore, representing the first consolidation and expansion of space for UPCI physicians and researchers.

1993

UPCI researchers are the first in the country to create and test a novel, synthetic vaccine (MUC-1) against pancreatic, breast, and other cancers. ▼



\$10 million from the Henry L. Hillman Foundation, the Hillman Foundation, and **Henry L. Hillman** himself, made possible the construction of Hillman Cancer Center on a two-acre parcel adjacent to UPMC Shadyside, which not only created an exceptional treatment center and research building, but served as a catalyst in the revitalization of that corridor of the community, as well.

Hillman Cancer Center would become a 180,000-square-foot, state-of-the-art laboratory research facility and a 165,000-square-foot outpatient cancer care and clinical research facility. Together with the adjacent 105,000-square-foot UPMC Cancer Pavilion that houses faculty and administrative offices and a conference center, Hillman Cancer Center serves as the central location for all cancer-related activities at the University of Pittsburgh, UPCI, and UPMC Cancer Centers.

In 2000, as Hillman Cancer Center was under construction, a second medical oncology group known as Oncology Hematology Associates (OHA) joined the UPMC network. Founded by partners

Stanley Marks, MD, and **Jeffrey Shogan, MD**, OHA comprised a group of about 30 medical oncologists that was centered in Pittsburgh with several additional sites in community locations, including Beaver, New Castle, and Johnstown. OHA became part of UPMC, centralizing its network and its physicians at Hillman Cancer Center and becoming the clinical arm of the new cancer center.

The former OHA also brought with it extensive radiation oncology and physics expertise through its program, headed by **Shalom Kalnicki, MD**, and the UPMC Cancer Centers community network was created. Drs. Shogan and Marks assumed administrative roles in running UPMC Cancer Centers, in addition to their patient care responsibilities.

Shortly thereafter, Drs. Shogan and Marks and **Chuck Bogosta**, then UPMC vice president of Cancer Services, approached the UPMC board to explore additional delivery sites to augment the network's radiation oncology and medical oncology services throughout the region. Fueled by both the desire to



Top: From left, Drs. Jeffrey Shogan and Stanley Marks, partners in Oncology Hematology Associates, Dr. Arthur Levine, current senior vice chancellor for the health sciences and dean of the University of Pittsburgh School of Medicine, and Dr. Ronald Herberman, founding director of UPCI, hold an outdoor news conference at UPMC Shadyside in summer 2000 to announce that OHA had joined UPMC.

Bottom: The final beam, painted white and signed by construction workers on the site, is lowered into place to connect the research building and clinical building — both literally and symbolically — as part of the “topping out” ceremonies at Hillman Cancer Center on Dec. 11, 2000.

1995

UPCI investigators create computer program that accelerates gene mapping.

FDA approves interferon alfa 2b therapy, pioneered at UPCI. It is the first and remains the only treatment for surgically treated melanoma at high risk of recurrence.

1996

UPCI researchers discover a gene for inherited pancreatitis, which is associated with high risk for pancreatic cancer.

1997

UPCI researchers discover a biological switch that drives lung cancer growth.

1998

First combined PET/CT is pioneered and tested for diagnosing and assessing treatment of cancer patients.



1999

Hillman Cancer Center breaks ground, thanks to transformational gifts from **Henry L. Hillman**, the **Henry L. Hillman Foundation**, and **Hillman Foundation**.



The hands that provide patient care in the clinical setting are often the same hands that make breakthrough discoveries in the laboratory, thanks to the many physician-researchers at UPCI.

reach underserved areas in the region and to bring state-of-the-art radiation oncology technology to those areas, an expansion plan was outlined.

The UPMC board supported the plan with an \$80 million investment. Where there were no radiation oncology facilities, UPMC built its own; where there were outdated facilities and equipment, UPMC partnered with existing hospitals to replace and improve services. Several new sites—UPMC Cancer Center at St. Clair Hospital in Mt. Lebanon, John P. Murtha Regional Cancer Center in Johnstown, and Arnold Palmer Pavilion in Latrobe—were developed simultaneously.

Throughout the decade, UPMC Cancer Centers continued to grow its network to the 10 medical oncology, 18 radiation oncology, and 10 dual medical oncology and radiation oncology sites it operated in 2010.

Meanwhile, under Dr. Herberman's visionary leadership, UPCI had developed into a premier organization that began setting national standards for matrix cancer centers by integrating excellent

patient care with cutting-edge research and outstanding educational opportunities. Faculty recruitment and cancer-related funding continued to increase consistently and significantly.

In 2007, after more than two decades at the helm, Dr. Herberman announced his retirement and a national search for a successor was launched. This search resulted in the appointment of **Nancy E. Davidson, MD**, an internationally renowned breast cancer physician-researcher from the Johns Hopkins Kimmel Cancer Center, to serve as director of UPCI and the UPMC Cancer Centers.

UPCI has grown to 625 researchers, including 348 faculty members, with total peer-reviewed research grant funding in excess of \$95 million and NCI-awarded direct cost funding of \$42.5 million in 2009. The translational and collaborative nature of the UPCI scientific community is reflected in its increased portfolio of multi-investigator, cancer-focused grants, including three Specialized Program of Research Excellence (SPORE) grants, eight cancer-related Research Program

2001

UPMC Cancer Centers' clinical oncology care and research network is formally established across the tri-state area.

2001

Patient volume doubles to more than 25,000 new patients per year, making UPMC Cancer Centers one of the largest cancer networks in the United States. ▼

2001

NCI awards a SPORE grant to UPCI for lung cancer research, thereby recognizing it as one of the top lung cancer programs in the United States.

2001

Mario Lemieux Foundation provides a \$5 million gift to UPMC to establish the Mario Lemieux Centers for Patient Care and Research. ◀

25,000+





Project Grants, two Early Detection Research Network grants, and 14 cancer-related training grants in 2009.

UPCI's faculty members are among the most highly respected experts in cancer medicine, and their efforts in basic, translational, clinical, and population-based science have made significant contributions to cancer research and care. In the past five years, UPCI members have published more than 4,400 unique scholarly articles, of which approximately 45 percent represent collaborative efforts.

A key tenet of Dr. Davidson's vision for UPCI is translational research: expediting the transfer of the information learned in the laboratory to the delivery of cancer care. UPCI's structure supports and augments the ability—and agility—of our physician-researchers to accelerate the application of science at the bedside. Discoveries made in the laboratories at UPCI are translated into investigator-initiated clinical trials and implemented through UPMC Cancer Centers' unique network of care sites, enabling physicians to treat patients with the latest treatment

Hillman Cancer Center brings together a 180,000-square-foot research and lab facility and a 165,000-square-foot outpatient care and clinical research facility that serves patients throughout the western Pennsylvania, eastern Ohio, and West Virginia panhandle region.

2002

Hillman Cancer Center opens. ▼

2002

The **Giant Eagle Foundation** Endowed Chair in Cancer Genetics is established at UPCI.

2004

National Cancer Institute awards a SPORE grant to UPCI for head and neck cancer research, thereby recognizing it as one of the top head and neck cancer programs in the country.

2004

The **Sampson Family** Endowed Chair in Thoracic Surgical Oncology is established at UPCI.

2004

The **Wheeler Family** makes a \$1 million challenge grant and \$4 million is raised through the 2004 Hillman Cancer Center Gala. ▼

2003

David C. Koch Regional Cancer Therapy Center is established at UPMC Cancer Centers.



\$1,000,000



UPCI is cultivating not only a new crop of scientific discoveries, but also a new crop of some of the country's brightest scientists. Among the up-and-coming investigators conducting all phases of clinical trials are, from left, Ahmad Tarhini, MD; Jan Beumer, PharmD, PhD; Shannon Puhalla, MD; Leonard Appleman, MD, PhD; Hussein Tawbi, MD, MSc; Rachel Jankowitz, MD; and Stergios Moschos, MD.

modalities in the most compressed time possible.

In late 2010, UPCI completed a five-year NCI review, which is required to maintain its status as an NCI-designated Comprehensive Cancer Center. This prestigious designation, which UPCI has held continuously for more than 20 years, recognizes our wide-ranging and transdisciplinary research, education, and outreach activities that bridge the full spectrum of cancer care.

Today, the combined assets of UPCI and UPMC Cancer Centers stand as one of the country's largest academic and community networks of cancer physicians, researchers, and specialists. Its 38-site network serves a geographic area encompassing the western Pennsylvania region. More than 2,300 physicians, scientists, administrative staff, and other health care professionals, including more than 180 oncologists, serve the patients treated at UPMC Cancer Centers.

2005

Hillman Foundation, along with the Henry L. Hillman Foundation, establishes the **Hillman Fellows Program** for Innovative Cancer Research at UPCI through a major gift that provides seed money for scientists to carry

their investigations into new, uncharted territory. This gift also launches a new capital campaign to benefit UPCI and UPMC Cancer Centers.



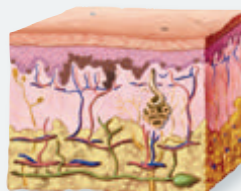
2005

The **Arnold Palmer** Endowed Chair in Cancer Prevention is established at UPCI. ▼

UPCI researchers use new technologies to discover patterns of gene and protein activity associated with cancer risk.

2005

The **Sandra and Thomas Usher** Endowed Chair in Melanoma is established at UPCI. ▼



2006

The second major breast cancer prevention trial conducted at UPCI and around the world shows that the drug raloxifene is as effective in preventing breast cancer as the drug tamoxifen, which was approved in 1998.

Linking the Past and the Present

Long-time Employees Recount Early Years of UPCI

In 25 years, the University of Pittsburgh Cancer Institute (UPCI) has grown both in size and scope, and only by looking back on its early years can the scale of that accomplishment be realized. One person with a unique perspective on that growth is **Dorothy Mann**, now the executive assistant to **Nancy E. Davidson, MD**, UPCI's current director. Dorothy joined UPCI at its very beginning and for 25 years served in various positions at UPCI, including executive assistant to **Ronald B. Herberman, MD**, UPCI's founding director.

Dorothy recounts the days when she was part of a tiny staff of five working from cramped, makeshift office space in the Western Psychiatric Institute and Clinic to recruit researchers whose discoveries would eventually translate into some of the most advanced clinical care for cancer patients. "Back then, the team was so small that we all knew each other very well," she says. "A short time later, our researchers moved to a little research building on Forbes Avenue and the administration was relocated to what was then the Eye and Ear Hospital. We'd all meet to have lunch together — it was like a little intimate family."

Joanna Stanson, who was hired in 1987 as a research lab assistant to **Theresa L. Whiteside, PhD**, a pioneer in head and neck cancer, immunobiology, and immunology, now supervises the cellular products laboratory at UPCI. She agrees. "We were a small family; everybody knew everybody so well — we had a cake for every birthday. We were always busy." Busy building the foundation of something that none of them could have envisioned. "Except for Dr. Herberman," Dorothy notes.



Dorothy Mann

2007

The **Gregory T. H. Davies** Endowed Chair in Brain Tumor Research and Physician Education is established at UPCI.

2008

Merkle cell polyomavirus (MCV), the seventh virus known to cause cancer, is discovered by the same UPCI researchers who also discovered the Kaposi Sarcoma Herpes Virus (KSHV), the sixth cancer-causing virus discovered. ◀

2008

National Cancer Institute awards a SPOR grant to UPCI for melanoma and skin cancer research, thereby recognizing it as one of the top melanoma and skin cancer programs in the United States.

2008

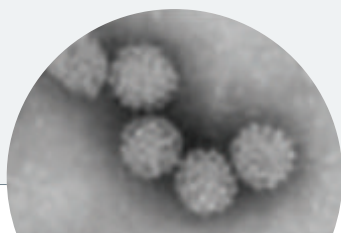
The **Frieda G. and Saul F. Shapira** BRCA Cancer Research Program is established.

2009

Nancy E. Davidson, MD, is recruited to serve as the new director of UPCI and UPMC Cancer Centers. ▶



Tolstov Y, Pastrana D, Feng H, Becker J, Jenkins F, Moschos S, Chang Y, Buck C, Moore PS. Human Merkel cell polyomavirus infection II. MCV is a common human infection that can be detected by conformational capsid epitope immunoassays. *Int J Cancer*, 2009. 125:1250-1256.





Joanna Stanson

From that small office, the seeds of change started to spread and take root throughout the Oakland campus, bringing cancer researchers from different disciplines together in the spirit of collaboration. “We were constantly recruiting,” Dorothy remembers. “That’s what I did for the first five years — bring people in to start to develop the research, develop the clinical side. More and more collaborating started to occur on campus. A lot of researchers had been trying to do it on their own, and once UPCI became a focal point for cancer research and we had the resources — the funding — it all started to evolve.”

“Slowly but surely, our lab started to get recognition, both in the United States and overseas,” Joanna adds. “Post-doctoral fellows from all over the world came to work with Dr. Whiteside, and we started to draw bigger and bigger names. They were all coming to learn and to share knowledge.”

“That was an exciting time — not only for us, but for people all across the campus,” Dorothy says. “We had members at Pitt and Carnegie Mellon University from so many different areas, all working together to stimulate more research. Our common goal was to create an institution with high research standards. I think the research was driven more by its application for clinical care — about doing research that would help real people.”

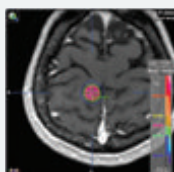
Growing UPCI wasn’t always easy, but growth was a part of the vision both Dr. Herberman and **Thomas Detre, MD**, the University’s senior vice chancellor for the health sciences, shared for UPCI, and they didn’t stray from it. “It was hard for some people to adjust as UPCI grew into a larger academic enterprise, and it was a tough time. But when I look back, I realize they were all growing pains we had to endure to become what we are now,” Dorothy says.

2009

UPCI takes a lead in developing new targeted therapies for cancer, including treatments that target genetic mutations linked to breast, ovarian, and pancreatic cancers (PARP inhibitors).

2009

The 10,000th brain tumor patient is treated via Gamma Knife® surgery at UPMC. ▼



2010

UPCI retains its **Comprehensive Cancer Center** designation by the National Cancer Institute, with the successful renewal of its Cancer Center Support Grant for another five years.

2010

UPCI receives a \$3 million gift from the **Mario Lemieux Foundation**, which will be used to establish the Mario Lemieux Center for Blood Diseases at Hillman Cancer Center. The gift caps the successful completion of a five-year, \$100 million capital campaign that was

kickstarted by a \$20 million gift from The Hillman Foundation and Henry L. Hillman Foundation. ▼



As UPCI grew, its facilities expanded as well, but not always at the same pace. “In the early years, we had people in buildings all over the Oakland area and secretaries would have to cart paperwork back and forth,” explains Dorothy. “Just to get a meeting together was a challenge — we’d meet in restaurants to try to get a central location — and those were the days before e-mail, faxes, and cell phones. We never really had a home until we moved to the new Hillman Cancer Center on the Shadyside campus.”

Hillman Cancer Center, located adjacent to UPMC Shadyside, is a physical representation of the vision Dr. Herberman had for UPCI even in its earliest years: An environment with the latest technologies for scientific investigation, linked by physical and intellectual bridges to a hospital and outpatient treatment facility where that research could be applied in a clinical setting by some of the world’s brightest researchers.

Transformational Growth

Seeing what UPCI has become still amazes these long-time employees, and their passion for staying has been strengthened by its growth. “I truly cannot imagine working anywhere else,” says Dorothy.

Being a part of that growth and seeing what UPCI, Hillman Cancer Center, and medicine have done for the community and the Pittsburgh region has been especially fulfilling.

“As I traveled daily to work in Oakland, I remember seeing the closed steel factories, which were dark and abandoned, like a war zone,” Joanna recalls. “Never in my wildest dreams would I have imagined that those dark mills would become the vibrant technology center for UPCI today. It just seemed to happen so quickly.”

Dorothy has the same recollections. “I grew up in bustling Morningside and walked these streets when I was young. Then, when the steel mills were closing and people were losing their jobs — well my dad was a steelworker and my friends’ dads worked in the mills, so it was just sad to be in this neighborhood watching it go downhill, as the biggest employers were closing their doors. Medicine and education really have revitalized Pittsburgh, and Hillman Cancer Center has revitalized the Shadyside area.”

“In my opinion, with the brilliant minds at UPCI working together, success is just around the corner. It makes me feel good to know that I play a part in something so important, even if it’s a small part.”

Dwayne Williams, a 19-year employee at UPCI, who works in the glassware facility and is responsible for cleaning and sterilization in the labs

“Working at UPCI brings a purpose to my work. I know that it is only through continued research that we will overcome this disease.” **Christine Stehle**, senior lab technician, who is an 11-year employee

“The research work I do is very far removed from treating patients, but I hope that the interaction between labs like mine and other clinical labs pushes research forward faster. I am proud that I do cancer-related research.”

Lisa Bailey, a 15-year employee, who is a research specialist at UPCI

“Knowing that I am part of the incredible discoveries that have come from UPCI is the most rewarding and awesome feeling. I’m proud to be a member of the UPCI family.” **Joan Neitznick**, department administrator for Basic Research Services, who is a 10-year UPCI and a 30-year University employee

UPMC Cancer Centers

Patie

ntCare

UPMC Cancer Centers is one of the nation's largest networks of outpatient cancer care centers. With specialty services consolidated at Hillman Cancer Center, the network's flagship site, UPMC Cancer Centers offers patients access to world-class medical oncology and radiation oncology services through a vast network of 37 additional community locations.

Foundation of the Patient Experience



The Hillman Cancer Center is the central facility of the 38-site UPMC Cancer Centers network.

Working in partnership with the University of Pittsburgh Cancer Institute (UPCI), western Pennsylvania's only National Cancer Institute-designated Comprehensive Cancer Center, UPMC Cancer Centers provides cancer care to the entire western Pennsylvania region.

UPMC Cancer Centers' mission is to provide the highest quality, most comprehensive clinical care for patients through a multidisciplinary approach, which draws on the skills and expertise of specialists in many different areas. This approach provides the most efficient, most effective, and most complete treatments for all types of cancer.

Patients at UPMC Cancer Centers directly benefit from this approach and are treated by a team of professionals whose expertise and care is unsurpassed in depth of knowledge, skills, and experience in both common and rare types of cancer. Medical oncologists may call on the expertise of a wide variety of specialists, including radiation oncologists, surgical oncologists, pathologists, immunologists, molecular biologists, geneticists, pharmacists, dietitians, social workers, occupational and physical therapists, psychologists, psychiatrists, and pain management specialists to provide a comprehensive plan for each patient.

Medical Oncology

Many people think of medical oncologists as the doctors who write their prescriptions for medications and chemotherapy to treat cancer. But at UPMC Cancer Centers, medical oncologists are an important part of the foundation upon which the entire framework of a patient's care experience is built.

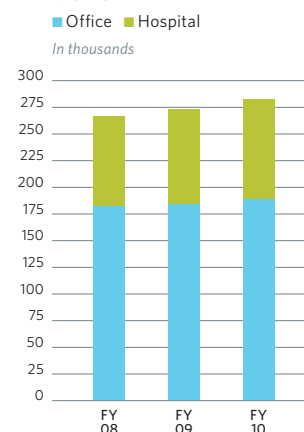
From the moment of diagnosis, throughout the course of treatment, and into survivorship, medical oncologists serve as the link to a complete spectrum of medical treatments and services. Their goal is to provide patients with a seamless coordination of medical oncology treatments and surgical and radiation oncology options, and to facilitate the ease and convenience of receiving this care as close to home as possible.

UPMC Cancer Centers' medical oncology network comprises 18 medical oncology offices and 10 combined medical oncology and radiation oncology offices which serve the western Pennsylvania, eastern Ohio, and West Virginia panhandle region. With more than 70 medical oncologists, this network represents a collection of some of the nation's most highly qualified and respected physicians and researchers in cancer medicine.

THE MEDICAL ONCOLOGY PROGRAM OFFERS CONVENTIONAL CHEMOTHERAPY, AS WELL AS THE MOST ADVANCED TREATMENT OPTIONS, INCLUDING:

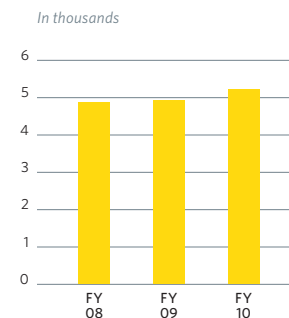
- Targeted therapies**, which attack specific proteins released by tumors to stop the growth and division of cancer cells. These therapies can be used alone or in conjunction with conventional chemotherapy to treat advanced cancers. Among the newest targeted therapies offered are anti-angiogenic therapy, which blocks the formation of blood vessels that supply tumors with the blood and oxygen needed to grow and spread, and epidermal growth factor receptors (EGFR) inhibitors, which help to prevent tumor cells from dividing, growing, and spreading.
- Stem cell transplantation**, which can be an effective treatment for patients with advanced or recurrent cancers of the blood, such as leukemia and lymphoma. High doses of chemotherapy and/or radiation therapy are needed to kill existing bone marrow that is producing the cancerous cells, followed by the transplant, which is done on an inpatient basis. Currently, 85 percent of transplants performed at UPMC Cancer Centers use stem cells; however, bone marrow transplantation is still an appropriate therapy in some circumstances.
- Hormone therapy**, which is used against cancers that depend on hormones for their growth, such as breast and prostate cancers. Hormone therapy keeps cancer cells from getting or using the hormones they need by stopping the production of certain hormones or altering how they work.
- Biological therapy**, also called immunotherapy or biologic response modifier therapy (BRMT), which helps harness the body's own immune system to fight disease or protect itself from some of the side effects of cancer treatment. Monoclonal antibodies (MoAb), interferon, interleukin-2, and cancer vaccines are types of biological therapies.

UPMC CANCER CENTERS VISITS*



* New visits are **not** unique patients. Total visits excludes UPMC Northwest and Erie Regional Cancer Center.

TOTAL CHEMO STARTS**



** Does not include: Hillman Cancer Center 2nd floor, HOA Passavant, UPMC McKeesport, Magee-Womens Hospital of UPMC, UPMC Horizon, UPMC Northwest, or Erie Regional Cancer Center.

Medical Oncology




Opposite: Justi Shannon, RN, BSN, provides reassurance to a patient before chemotherapy treatment in one of the semi-private outpatient chemotherapy suites at Hillman Cancer Center.

- **Regional perfusion**, which delivers high concentrations of chemotherapy directly to the site of the cancer rather than through the bloodstream, as in conventional chemotherapy. The chemotherapy is circulated through an organ or within a certain region, bathing the cancer in the medication to treat it. This method of delivering the medication may increase its likelihood of effectiveness while minimizing the side effects to the patient.
- **Clinical trials**, access to which is one of the most significant benefits of UPMC Cancer Centers' partnership with UPCI. Clinical trials, or research studies, offer cutting-edge options for patients with cancer. They evaluate promising new therapies and answer scientific questions with the goal of finding treatments that are the most effective in controlling cancer with the fewest side effects. Each year, roughly 4,500 patients are enrolled in approximately 300 active clinical trials in all phases of study and for nearly every type of cancer through UPMC Cancer Centers and UPCI. Every effort is made to enroll eligible patients in clinical trials, and many of them allow patients to participate through UPMC Cancer Centers locations near their homes.

Medical oncologists work hand in hand with surgical oncologists and radiation oncologists to design individualized treatment plans using established best standard-of-care treatment recommendations, often a combination of regimens given concurrently. In many cases, patients have access to UPMC surgeons for surgical approaches to cancer treatment; in other areas, UPMC Cancer Centers has developed collaborative working relationships with community physicians and hospitals outside our network. This mutually beneficial arrangement provides a continuum of care for patients right in their communities. UPMC Cancer Centers physicians also consult with partner physicians in the community on difficult cases and send patients back to referring physicians for follow-up care.

MedicalOncology



Stem Cell Transplantation Program of UPMC Cancer Centers Receives FACT Reaccreditation

The Hematopoietic Stem Cell Transplantation Program at UPMC Cancer Centers recently received reaccreditation through the Foundation for the Accreditation of Cellular Therapy (FACT). FACT, which establishes standards for high-quality medical and laboratory practice in cellular therapy programs, is the only accrediting agency in the United States that addresses all quality aspects of cellular therapy treatments, including clinical care, donor management, and cell collection, processing, storage, transportation, and administration.

FACT accreditation sets the global standard for top-quality patient care in cellular therapies and comes only after an intensive self-study and on-site inspection of the facility by external reviewers. Although voluntary, FACT accreditation is a “must have” to be accepted and competitive in the field of cellular therapy. Many health insurance and managed care plans require FACT accreditation for patient care reimbursements.

The UPMC Cancer Centers’ Hematopoietic Stem Cell Transplantation Program has been FACT-accredited since 1999, only three years after FACT’s standards were developed, and was reaccredited in 2010. The Stem Cell Program harvests autologous (self donor) and allogenic (sibling or unrelated donor) stem cells derived from peripheral blood drawn from the circulatory system through a type of blood donation called apheresis. The program has treated an average of 128 patients per year over the last three years, which makes it the largest stem cell transplant program in western Pennsylvania.

Linking Optimal Care Across the Network

Clinical Pathways

New and innovative cancer treatments are being developed all the time. But even the most revolutionary breakthroughs in cancer care can only be effective if patients are able to access them.

One proactive method that the University of Pittsburgh Cancer Institute (UPCI) and UPMC Cancer Centers physicians have undertaken to ensure optimal standards for oncology care across the UPMC Cancer Centers network has been the development of evidence-based medical and radiation oncology protocols for treating patients. Called “Clinical Pathways,” these standards help reduce variability in treatment, improve outcomes for patients, and keep medical costs down.

Development of the Clinical Pathways was spearheaded by the team of **Stanley Marks, MD**, chief medical officer, **Peter Ellis, MD**, associate chief medical officer, and **Dwight Heron, MD, FACRO**, director of radiation oncology at UPMC Cancer Centers.

Through its for-profit affiliate Via Oncology, UPMC Cancer Centers over the past six years has developed disease-specific Pathways that direct oncologists to the single best treatment regimen for each patient. Pathways Committees — teams of academic and clinical oncologists — regularly review the current literature and clinical practices to update the Pathways for each of 16 different cancers, stage by stage, and by subcategories. Pathways

Amy Mcklveen, RN, OCN, readies a patient for a chemotherapy treatment at the Arnold Palmer Pavilion, a joint venture of UPMC Cancer Centers and Excelsa Health, in Greensburg, Pa.



The Pathways are reviewed quarterly by multidisciplinary committees to remain at the leading edge of care.

identify the most effective, least toxic treatments. When available, a therapeutic clinical trial is the first option considered for all stages of cancer in our Pathways. This process allows the Pathways Committees to select regimens that are evidence-based, clinically appropriate, and uniformly adopted by all oncologists, regardless of practice site.

Currently, Clinical Pathways address more than 84 percent of all new cancer diagnoses, including every state and stage of breast, colorectal, esophageal, head and neck, lung, ovarian, pancreatic, prostate, renal cell, thyroid, and uterine cancers, and melanoma, as well as such hematological malignancies as myeloma, lymphoma, and myelodysplastic syndrome.

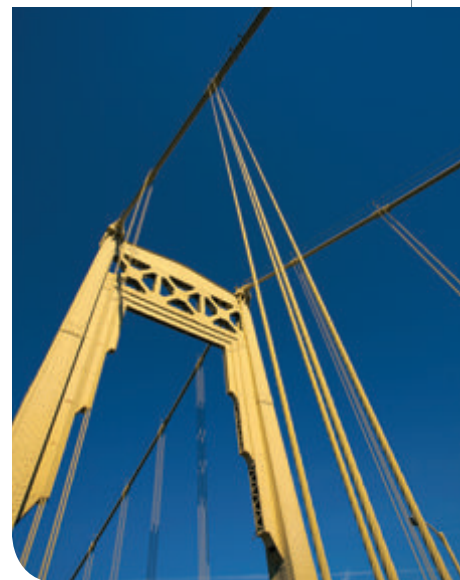
Computer software integrates Pathways usage into the physician's daily work flow to support treatment decision-making. With this web-based, real-time platform, physicians log onto the secure website and use a live interface to update each existing patient's medical record, or to submit data from the examination of a new patient.

Through an interactive process, the oncologist can decide to follow the Clinical Pathway or, because of individual circumstances, deviate from the Pathway for that patient's treatment plan. Similarly, existing Pathway plans can be continued or changed depending on the patient's lab and test results, accessible via the web.

AMONG THE MANY BENEFITS OF USING CLINICAL PATHWAYS:

- Developed by academic and community oncologists, Pathways provide the latest treatments that can be uniformly applied in any care setting.
- Clinical Pathways favor the most effective, least toxic regimens and enable standardized patient education.
- Clinical Pathways cover the vast majority of new cancer cases and utilize multiple modalities of treatment to provide the comprehensive coverage needed to optimize cancer care across the continuum.

The Clinical Pathways plan is not a "cookie-cutter" approach to patient care — but rather enables the individual physician to take advantage of the medical evidence, collective experience, and knowledge base of a panel of experts to make personalized and individualized informed decisions about each patient. "In my view the greatest advantage of the Clinical Pathways is that they are not only a current resource for treatment options and clinical trials available in the UPMC Cancer Centers network for a variety of common cancer types, but they improve patient safety, as well," says **William Ferri, MD**, a medical oncologist who practices at the UPMC Cancer Center, Beaver, in Beaver, Pa.



ClinicalPathways

Providing Patient Care Close to Home

The Community Network

The channels through which patients come to the community locations of the UPMC Cancer Centers for medical oncology care may differ, but once patients enter the system, they have access to the entire network. This hub-and-spoke model of patient care accommodates referrals back and forth between the specialists at Hillman Cancer Center and the satellite sites of the network, and can be an important part of the treatment plan.

“I may be brought in on a consult to help establish a diagnosis for a patient who was initially sent to Pittsburgh by their own doctor, or I may get a referral from a surgical oncologist in Pittsburgh for a patient’s adjuvant care here,” says

Dr. Edgardo Lob, medical oncologist at UPMC Cancer Center, Greenville, says his patients appreciate his continuing collaboration with specialists in Pittsburgh while he directs their care and treatment.

Michael Voloshin, MD, a medical oncologist who practices at the UPMC Cancer Center in Windber, Pa., and the John P. Murtha Regional Cancer Center in Johnstown, Pa. “Sometimes I get referrals for patients who go to Pittsburgh occasionally for follow-up care, but just can’t make the trip for frequent check-ups.”

Easier access for patients is just one of the many benefits of being part of a large network that offers specialty care at its central facility in Pittsburgh. “The ability to offer treatment recommendations that are in conjunction with those developed in Pittsburgh is important to my patients,” says **Edgardo Lob, MD**, the medical oncologist at UPMC Cancer Center, Greenville. So is the fact that he knows the specialists personally when he’s referring patients to them. “I’m working in collaboration with specialists at UPMC Cancer Centers and if I need to send a patient to Pittsburgh for a special treatment or surgery, I’m referring to specialists there who I know personally. We’re part of the same system. Patients like that.”

Dr. Voloshin agrees. “Patients are more confident when they understand that I know these specialists and they know me. They realize that they’re getting access to expert second opinions, more technical treatments, and surgical specialists through the system,” he says. “I set up



I'm working in collaboration with specialists at UPMC Cancer Centers and if I need to send a patient to Pittsburgh for a special treatment or surgery, I'm referring to specialists there who I know personally. We're part of the same system. Patients like that.

—DR. EDGARDO LOB

their appointment for them in Pittsburgh and give them information on where the office is located. They're reassured that the doctors are in communication with me—and the patients feel the world is a smaller place when I have that connection to their care.”

There are other benefits to being seen in the community setting, as well—there's a personal touch that local physicians can offer. “I treat patients and get to know them and meet their families,” says Dr. Lob. “I run into patients at local restaurants, or at Walmart, or local sporting events. Former patients give new patients personal references, and people will come to me and say ‘My next door neighbor goes to you.’”

But receiving care in the community does not have to mean receiving anything less than the highest standards of care, thanks to the Clinical Pathways that were developed at UPMC Cancer Centers. Clinical Pathways are unified, outcome-based treatment plans that combine the latest clinical trials with the most effective standard therapies for specific cancers.

Getting patients enrolled in clinical trials is another important benefit of being linked to a network that is part of an NCI-designated Comprehensive Cancer Center. “We encourage patient participation in clinical trials and patients think that sounds like a great idea, but often get nervous about making a

commitment to going into Pittsburgh every time they need a treatment,”

Dr. Voloshin says. “For our younger patients, they're apt to travel with no problem; but for our older patients, that can be a real burden. We're able to participate in many of the same clinical trials by offering the treatments here, or by continuing treatments on protocols that have been initiated in Pittsburgh, so patients don't feel that they have to drop out of clinical trials just because of travel difficulties. That's a distinct benefit of being part of a network.”

Dr. Michael Voloshin, medical oncologist at UPMC Cancer Center, Windber, knows that his patients find value in being part of a large cancer center network that enables them to access clinical trials in the community setting.



A Bridge Over Troubled Water



Caring for Patients With Cancer

When **Leslie Stewart, RN, ADN, OCN**, became a nurse 20 years ago, she wanted to specialize

in oncology but was discouraged by other nurses. "Oncology nursing is very intense and it can be overwhelming," says Leslie, a clinical nurse manager at the Arnold Palmer Pavilion at Mountain View Medical Park in Greensburg, Pa. Undaunted, she became an oncology nurse anyway, and has served as the nurse manager at Palmer for the last seven years. "I served initially as a lead nurse and am now a nurse manager because I didn't want to be that removed from patient care. My favorite place to be is with the patients."

That same sentiment echoes true for **Shelly Greenalch**, who schedules patient appointments and runs the front office reception desk at UPMC Cancer Center, Natrona Heights. "I like what I do. I like getting to know the patients and their families," she says, "and I want them to feel like they're part of our family."

Getting patients and families to feel comfortable can be just the right thing at the right time when they're dealing with a cancer diagnosis or treatment. "Patients are often nervous or scared — they're struggling. I see a lot of seniors and I try to make them feel special by connecting with them on a personal level. Families often turn to staff for help when they're dealing with illness," Shelly says. Her willingness to go out of her



Caregiving never stops when you live in the same community as the patients you care for.

—LESLIE STEWART, NURSE MANAGER

way to make patients comfortable earned her UPMC's Award for Commitment and Excellence in Service (ACES). This peer-nominated award honors staff whose actions and attitudes exceed the high level of excellence that is expected at UPMC.

Leslie also has been known to go out of her way to make patients feel comfortable. "I've gone to patients' homes to give shots or stayed late to talk a family through a tough diagnosis. Sometimes it just takes more time to help a patient through a hard situation," she says. "We don't walk away from caregiving when we leave work. Caregiving never stops when you live in the same community as the patients you care for."

Special efforts of the nursing and office staff go a long way in improving patients' spirits and morale, and Leslie's staff has come up with some creative ideas for putting patients more at ease. "We've put up electronic bulletin boards with therapeutic images and uplifting messages in patient areas, and we hold little patient celebrations following a treatment or when a regimen is completed to acknowledge the accomplishment," she adds. Leslie also was instrumental in helping to obtain support from the Latrobe Area Hospital Charitable Foundation to continue the volunteer efforts started by the Crew of Pittsburgh organization in assembling "Satchels of Caring," handmade tote bags personalized by local women and stuffed

full of personal items, such as inspirational CDs, journals, scarves, soft socks, and skin lotions. A local boy heard about Leslie's desire to develop the satchels for men, and took up the idea as his Eagle Scout project, creating satchels for male patients, with shaving kits, socks, handkerchiefs, and snacks.

These personal touches make all the difference in patients' lives. "We've had patients' families come back to our office with donuts or candy to thank us or to memorialize their loved ones after they've passed away," Shelly says. "We just try to make a hard process a little bit easier for them."

Opposite, top: Leslie Stewart, nurse manager at the Arnold Palmer Pavilion at Mountain View Medical Park in Greensburg, enjoys being with her patients and often goes above and beyond to care for them.

Bottom: Shelly Greenalch, receptionist at UPMC Cancer Center, Natrona Heights, received UPMC's ACES award for her compassionate care for patients.

Below: Satchels of Caring — handmade tote bags — provide personal items for cancer patients at Arnold Palmer Pavilion in Greensburg.



We just try to make a hard process a little bit easier for them.

—SHELLY GREENALCH, RECEPTIONIST

Surmounting Obstacles Through Advanced Technology

RADIATION ONCOLOGY BY THE NUMBERS

Through UPMC Cancer Centers' network of 22 radiation centers, patients have access to:

- 32 linear accelerators
- 34 attending physicians
- 27 physicists
- 24 dosimetrists
- 100+ therapists

Opposite, top: CyberKnife® is a highly versatile stereotactic radiosurgery device capable of targeting tumors throughout the body with millimeter accuracy.

Bottom: PET/CT scanning combines a PET scan's ability to show metabolic activity in tissues with the high-resolution imaging of a CT scan. Here, a PET/CT scan shows the exact location of a brain tumor.

Radiation Oncology

UPMC Cancer Centers provides unsurpassed radiation imaging, radiosurgery, and radiation oncology technology, as well as a multidisciplinary team of world-class physicians to deliver it. The primary center for radiation oncology and radiosurgery is the Mary Hillman Jennings Radiation Oncology Center located at UPMC Shadyside in Pittsburgh. Linked to this central location are 11 community radiation oncology centers and 10 dual radiation oncology and medical oncology centers, making UPMC Cancer Centers one of the nation's most comprehensive radiation oncology networks.

Imaging

UPMC CANCER CENTERS USES THE MOST ADVANCED IMAGING AVAILABLE TO DEFINE TUMORS.

- **Computed tomography (CT)** uses x-rays and a computer to take detailed, three-dimensional pictures of tumors in the organs and bones.
- **Positron emission tomography (PET)** creates images of chemical and other functional changes in the body that CT scans cannot show.
- **4-dimensional CT (4-D CT)** gives a conventional CT the added dimension of time by accounting for motion and trajectory inside a patient as he or she breathes, essentially predicting with pinpoint accuracy where the tumor will be in time and space.
- **4-D PET/CT** combines a PET scan's ability to show metabolic activity in tissues with the high-resolution imaging of a CT scan. UPMC Cancer Centers is a world leader in the development and use of 4-D PET/CT scanning, which can profoundly change the intended treatment plans of patients that were made prior to their PET/CT scan. Our mobile PET/CT scanner makes this advanced imaging technology available to patients in outlying areas, and is in use seven days a week.
- **On-board imaging (OBI)** is a new imaging technology that takes a three-dimensional, 360-degree CT scan of a patient immediately before, during, and after delivery of a radiation treatment, while the patient is stationary. Especially useful for imaging cancers of the head, neck, prostate, lung, pancreas, and cervix, this tool makes accurate treatment imaging quick and easy by ensuring that the patient and the tumor are in the same position for each treatment.
- **Magnetic resonance (MR) spectroscopy** uses nuclear magnetic resonance imaging to obtain information about a tumor, not only locating it but also distinguishing biochemical traits, such as its aggressiveness.

Radiation Oncology Treatment

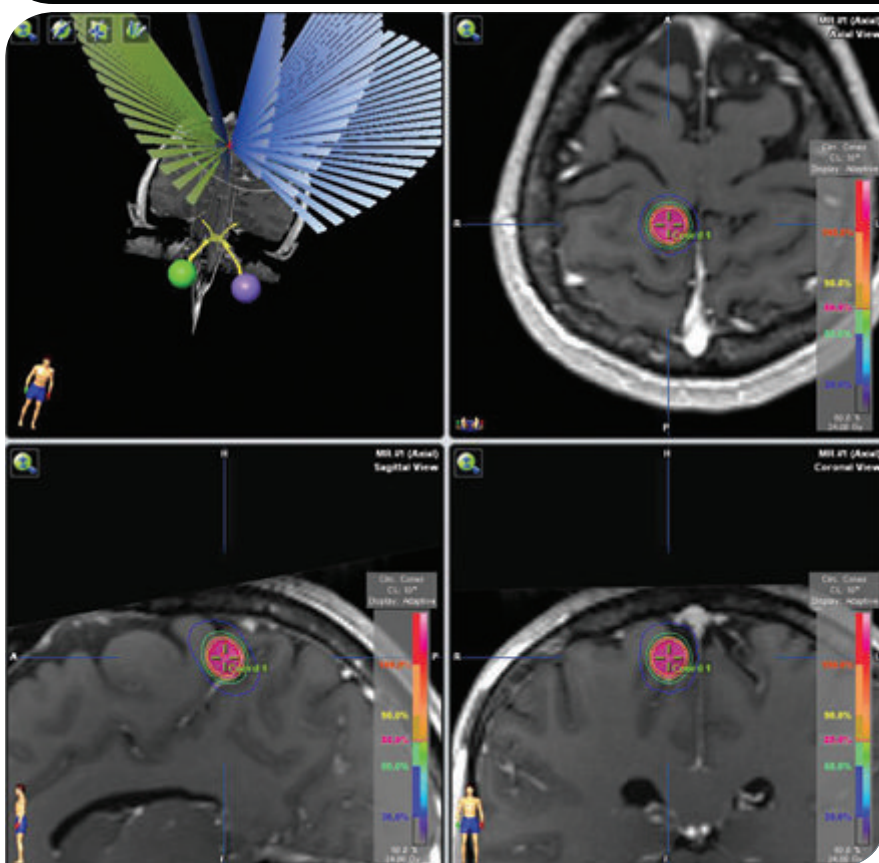
UPMC Cancer Centers offers the most advanced radiation technology, and is pioneering the use of its newest acquisition, the revolutionary and versatile Novalis® powered by TrueBeam™ STx system, located at the Mary Hillman Jennings Radiation Oncology Center at UPMC Shadyside. TrueBeam can be used for all forms of advanced external-beam radiation therapy and radiosurgery, delivering treatments in less than half the time, to increase patient comfort and improve precision of dose delivery to the tumor.

Two other advanced imaging systems—the Trilogy™ linear accelerator, which offers the capability to image tumors at different times of treatment delivery, and Synchrony™, an imaging system designed to accommodate breathing movement to precisely target tumors on or around the lungs—also are on the cutting edge of radiation technology. UPMC Cancer Centers uses all of these systems to treat even the most difficult tumors in the hardest places to reach, ushering in a new era of more effective, more accurate, and less toxic treatments.

OTHER ADVANCED RADIOTHERAPY

TECHNIQUES AND TOOLS USED BY OUR RADIATION ONCOLOGISTS ARE:

- **RapidArc®** administers a precisely sculpted dose of radiation to the tumor in a single 360-degree arc around the patient. Special “leaves” within the machine shape the beam to radiate the tumor from different angles helping to minimize exposure to healthy tissue.

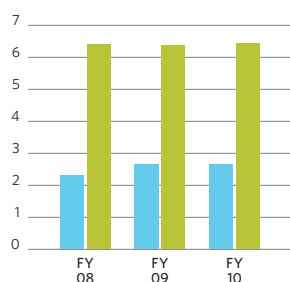




The TrueBeam STx system at the Mary Hillman Jennings Radiation Oncology Center at UPMC Shadyside cuts radiation treatment times in half, to maximize patient comfort and improve precision of dose delivery to the tumor.

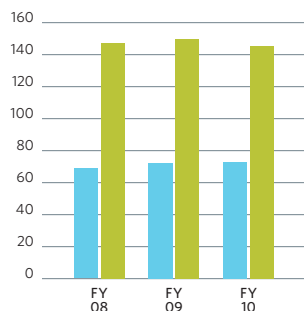
UPMC CANCER CENTERS' RADIATION ONCOLOGY STARTS*

■ IMRT ■ Total
In thousands



UPMC CANCER CENTERS' RADIATION ONCOLOGY TREATMENTS*

■ IMRT ■ Total
In thousands



* Fiscal Year running July 1 through June 30.
For entire network, excluding Erie Regional Cancer Center.

- **Image-guided radiotherapy (IGRT)** tracks a tumor through the full course of treatment as it changes shape, size, and position due to therapy.
- **Intensity-modulated radiation therapy (IMRT)** allows a highly precise beam of radiation to be shaped to better target the tumor and minimize radiation to adjacent tissues.
- **Gating** opens and closes the beam of radiation to spare normal tissues from being exposed as the patient breathes during treatment.
- **High-dose rate (HDR) brachytherapy** is a form of internal radiation therapy that includes the placement of radioactive metallic seeds, smaller than a grain of rice, inside the tumor to deliver radiation directly into the tumor. Brachytherapy can be used to treat prostate cancer, lung cancer, breast cancer, sarcoma, and other malignancies.
- **Conventional radiation therapy administration to treat tumors, as well as total body irradiation (TBI) treatments**, suppress a patient's immune system prior to hematopoietic stem cell transplantation, so it is less likely to reject the cells.
- **Combined modality therapy** might include radiation therapy and chemotherapy, or radiation therapy and biological response modifier therapies (BRMTs)—such as monoclonal antibodies (MoAbs), epidermal growth factor receptors (EGFRs), and vaccines—which boost or restore the immune system to fight cancers.

Many of these advanced therapies, such as IMRT, gating, and OBI, as well the conventional radiation therapies, are available in the community radiation oncology centers, as well as at Hillman Cancer Center.

Research

To advance the field of radiation oncology, our investigators are developing and testing new technologies, and evaluating novel applications of existing technologies. For example, studies are underway in radiation oncology's physics division to understand the interplay effect between the motion of multi-leaves and tumors. Exciting and novel tracers are being evaluated that could predict long-term response to cancer treatment very early in the course of therapy. Research conducted through the department's basic science division recently has resulted in an innovative clinical trial of radioprotective gene therapy to prevent damage to the esophagus and other normal tissues, a common side effect of radiation to the chest.

RadiationOncology

Reaching the Unreachable: Radiosurgery

Often called “bloodless surgery,” radiosurgery involves the use of highly complex and precise instruments such as linear accelerators, computers, and lasers that enable doctors to perform minimally invasive and non-invasive treatments in areas of the body that are difficult to reach.

Radiation oncologists work closely with surgical oncologists for the radiosurgical treatment of cancer using the CyberKnife,[®] a highly versatile stereotactic radiosurgery device capable of targeting tumors throughout the body with millimeter accuracy. The top site for its use worldwide, UPMC Cancer Centers has been a leader in pioneering the use of CyberKnife in the treatment of challenging spinal cord tumors for patients who are at risk of becoming paralyzed but are not candidates for surgical resection. In addition, UPMC Cancer Centers has the largest published clinical experience with CyberKnife treatment of recurrent head and neck cancers, offering new hope to patients with these challenging tumors when conventional treatment options have been exhausted.

UPMC Attains Radiosurgical Milestones

Another radiosurgery tool — the Gamma Knife[®] — was pioneered by UPMC physicians in 1987. This precise and powerful machine can destroy deep-seated brain tumors once considered inoperable. UPMC physicians became the first clinicians in North America to use the Gamma Knife, and assisted Gamma Knife designers and manufacturers over the years in the development of subsequent generations of Gamma Knife technology, which also were pioneered at UPMC.

In 2009, UPMC’s radiosurgical team performed its 10,000th Gamma Knife radiosurgery, a milestone that highlights UPMC as a world leader in radiosurgery experience.

In 1998, UPMC Cancer Centers was one of the first centers in the world to use the CyberKnife. Since then, our stereotactic radiosurgery program has treated thousands of patients for both benign and malignant tumors. The Mary Hillman Jennings Radiation Oncology Center, long known for its innovative approaches to managing complex cancers, recently was recognized as number one in the United States and fourth in the world for its 621 total procedures done using the CyberKnife in 2010, as reported by the CyberKnife Society, a non-profit organization dedicated to advancing the science and clinical practice of stereotactic radiosurgery.

Linking High Tech With High Touch

Opposite: Dwight E. Heron, MD, FACRO, director of radiation oncology for UPMC Cancer Centers, with the TrueBeam™ STx system, the most advanced radiation technology available.

A Tale of Two Cities

New trends in fashion typically start in larger cities, and may take years to catch on in the smaller communities. But when lives are on the line, allowing treatment trends to simply filter down to the local level takes precious time that cancer patients just don't have.

At UPMC Cancer Centers, new trends in technology are developed and refined at the UPMC Cancer Center in Pittsburgh and quickly implemented at the community cancer care centers.

Dwight E. Heron, MD, FACRO, director of radiation oncology for UPMC Cancer Centers, is responsible for securing the latest radiation oncology technologies for both the main facility and the entire UPMC Cancer Centers network.

"We're able to acquire the latest equipment here in Pittsburgh and get it into treatment plans right away, so patients are benefiting from it immediately as we perfect the techniques for using it," says Dr. Heron. "That lowers the learning curve so we can get the newest equipment and techniques out to the communities as quickly as possible."


Access to the latest technology is one of the major benefits of being part of a large network, according to **Steven S. Wilson, MD**, a radiation oncologist who

practices at UPMC/Jameson Cancer Center in New Castle, Pa., a city of about 25,000 people located an hour north of Pittsburgh. "Small cities can have a distinct disadvantage in terms of treatment resources," Dr. Wilson says. "It's not enough just to offer services to people in smaller cities if you're not able to offer high-quality clinics."

Dr. Wilson explains that, after years of living in big cities, he was attracted to a practice in a smaller community where he could escape the stresses of big-city living, live close to work, and get to know his patients on a more personal level. But after having had access to the latest technologies in his previous positions, he was disappointed by the radiation oncology resources he found at some small-town cancer centers he considered. Not so at UPMC/Jameson Cancer Center, he says.

"Being connected to a major cancer center provides the best of both worlds for radiation oncology patients at UPMC/Jameson Cancer Center," he says. "Our cancer center has access to the latest technology, but it's delivered in the small community setting. We offer high-tech, high-quality, convenient support for our local patients, many of whom are elderly and not able to travel long distances. That's critical for radiation oncology patients who must come in for treatments every day for several weeks in a row.

RadiationOncology

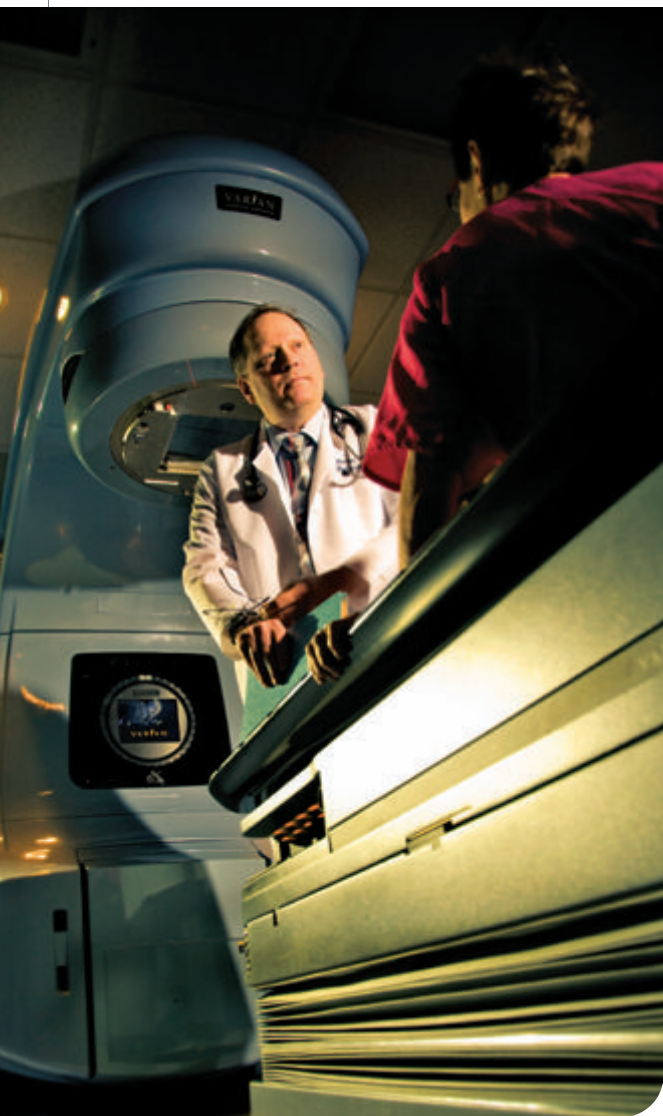
A man in a dark suit, light blue shirt, and patterned tie stands in a medical treatment room. He is positioned in front of a large, white, cylindrical medical machine that hangs from the ceiling. The machine has a circular opening at the bottom. The room is dimly lit, with a warm orange glow from the machine and a greenish light from a monitor on the right. The man's reflection is visible on the dark, polished surface of the machine's base.

We're able to acquire the latest equipment here in Pittsburgh and get it into treatment plans right away, so patients are benefiting from it immediately as we perfect the techniques for using it.

—DR. DWIGHT E. HERON

Being connected to a major cancer center provides the best of both worlds for radiation oncology patients at UPMC/Jameson Cancer Center. Our cancer center has access to the latest technology, but it's delivered in the small community setting.

—DR. STEVEN S. WILSON



Dr. Steven S. Wilson, radiation oncologist at UPMC/Jameson Cancer Center in New Castle, Pa., recently was honored by the University of Pittsburgh School of Medicine with the Leo H. Cripp, MD, Excellence in Patient Care Award for his exceptional efforts to provide compassionate care, physical comfort, and emotional support to patients and their families.

“We also serve as a conduit between private local physicians here in New Castle and the specialists in Pittsburgh,” he says. “So if a referring physician has a patient who needs access to the Gamma Knife® or CyberKnife®, we know exactly which specialist to refer them to for their particular area of expertise,” Dr. Wilson adds.

Dr. Heron also sees a great degree of collaboration and cooperation between the main facility and its satellite sites in the communities. “We consider all of our patients UPMC Cancer Centers patients no matter which network site they first visited,” he says. “The beauty of the network is that our community sites offer the latest technologies for the vast majority of patients—but, should they need a radiation boost or radiosurgery for a special case, they can be seen, evaluated, and treated at Hillman. Then they can receive follow-up care back at their local site. There’s a continuous flow of communication through the information systems, physicians, and staffs across the entire network to ensure that patients have full access to the best care we have to offer.”

Another advantage of that relationship is the use of Clinical Pathways—networkwide care standards—for radiation oncology. “Using Clinical Pathways, our studies prove that a patient can be treated here in Pittsburgh, at Jameson in New Castle, or at any of our community sites and the outcome will be identical,” says Dr. Heron.

Dr. Wilson agrees. “Clinical Pathways enhance our quality and offer uniformity within our network,” he says. “I get to know my patients and their families on a very close basis because we see each other so frequently during their course of treatment. I feel that I owe it to them to provide the highest level of care here at UPMC/Jameson Cancer Center—and with the support of the network behind me, I feel confident that I do.”

RadiationOncology

Channeling Through Cancer

General Surgical Oncology

The surgical oncology program at UPMC Cancer Centers specializes in the surgical treatment of a wide variety of cancers, including brain, breast, colorectal, endocrine, esophageal, gynecologic, head and neck, hepatobiliary, lung, melanoma, orthopaedic, pancreatic, prostate, and soft tissue sarcoma.

OUR TEAM OF MORE THAN 30 SURGEONS HAS PARTICULAR EXPERTISE IN A NUMBER OF HIGHLY SPECIALIZED TECHNOLOGIES AND HAS HELPED TO DEVELOP OR REFINE SUCH CUTTING-EDGE METHODS AS:

- laparoscopic colon resection, adrenalectomy, pancreatectomy, splenectomy, and liver surgery
- sphincter-sparing surgery for lower rectal cancers
- minimally invasive, robot-assisted surgery for pancreatic cancer
- chemoperfusion for tumors isolated in the arm or leg or tumors that have advanced into the peritoneal cavity or liver
- concentrated regional chemotherapy infusion for liver metastases

Breast Cancer Program

The UPMC Cancer Centers' Breast Cancer Program of UPMC works in partnership with the Magee-Womens Breast Cancer Program of UPMC Cancer Centers to offer the latest techniques for the surgical management of breast disease. Our experts have extensive experience in a number of highly specialized technologies, including minimally invasive surgical procedures, and offer consultation services to women diagnosed with or concerned about breast cancer. Treatments include presurgical or postsurgical chemotherapy, hormonal therapy, radiation therapy, and sentinel lymph node biopsy or axillary lymph node dissection. Additionally, plastic/reconstructive surgical evaluations are available to women considering mastectomy and breast reconstruction for either breast cancer treatment or risk reduction.

Endocrine Cancer

As one of the leading programs in the country for the treatment of endocrine disease, the Division of Surgical Oncology's Endocrine Surgery Program offers patients expert, comprehensive, multidisciplinary care for diseases of the thyroid, parathyroid, adrenal, and endocrine pancreas.

Endocrine surgeons work closely with highly specialized endocrinologists, radiologists, pathologists, and nuclear medicine physicians to provide a comprehensive team approach that meets each patient's individual needs.



Surgical oncologists at UPMC Cancer Centers are setting the standard for surgical cancer care by pioneering new procedures and training some of the region's finest surgeons.



A lot of patients have run out of options — they've exhausted the standard treatment approaches and they are looking for new hope.

—DR. DAVID L. BARTLETT

Gastrointestinal Cancer

The Division of Surgical Oncology's Gastrointestinal (GI) Surgery Program comprises faculty surgeons who have dedicated their careers to the treatment of patients with gastrointestinal diseases and cancers. The goal of the cancer program is to provide comprehensive, state-of-the-art care for patients with cancers of the stomach, duodenum, and small intestine, as well as the colon and rectum. Our surgeons are part of the Pancreatic Cancer Center and coordinate care for patients with complex disease involving the pancreas. Our surgeons provide comprehensive therapy approaches for liver tumors, including minimally invasive and robotic liver resections, local ablation therapy, chemoembolization, radioembolization, hepatic arterial infusion therapy, and isolated hepatic perfusion.

Faculty of the GI Surgery Program are devoted to providing personalized, high-quality, and state-of-the-art care, with an emphasis on minimally invasive surgical approaches, such as laparoscopic surgery (also known as key-hole surgery), and robotic surgery. Our practice includes active research projects that are investigating the impact of minimally invasive procedures on pain and recovery following surgery; testing new therapies for pancreas, colon, and other cancers; and improving the ability to predict a patient's response to these treatments. Our specialty programs include the Inflammatory Bowel Disease Center, the Minimally Invasive Colon Surgery Center, and the Pancreatic Cancer Center.

Novel Therapies

Our basic research faculty within the surgical oncology program work to develop novel therapies for cancer, including many recent advances in biologic therapies to treat cancer. The surgical oncology division is ideally structured to translate our basic research findings into patient care. Clinical researchers often care for patients who are not candidates for—or whose cancers have not responded to—standard treatments; these patients are encouraged to consider clinical trials of novel therapies.



Opposite: David L. Bartlett, MD, Bernard Fisher Professor of Surgery and director of surgical oncology for UPMC Cancer Centers.

A Lifeline for Patients With Challenging Cancers

David C. Koch Regional Perfusion Cancer Therapy Center

A unique component of UPMC Cancer Centers' surgical oncology program is the David C. Koch Regional Perfusion Cancer Therapy Center, where patients can receive perfusion treatment — a combination of surgery and chemotherapy — for tumors that have advanced beyond surgical removal but still are limited to an organ or region of the body. These chemotherapy techniques can provide hope for patients whose cancers have not responded to other treatments or whose tumors cannot be resected with traditional surgery and who might otherwise have limited treatment options.

Surgeons at the Koch Center have specialized expertise in providing regional perfusion of chemotherapy for such difficult-to-treat

cancers as regionally confined tumors of the liver, regionally confined melanoma, peritoneal carcinomatosis, peritoneal mesothelioma, tumors involving the pleural cavity, and other metastases, including advanced stages of colorectal cancer, gastric cancer, appendiceal cancer, ovarian cancer, gall bladder cancer, gastrointestinal stromal cancer, and sarcoma.

AMONG THE PERFUSION TECHNIQUES OFFERED ARE:

- **isolated limb perfusion (ILP)**, used to treat patients with melanoma or sarcoma whose tumors have developed in an extremity, such as an arm or leg, and cannot be surgically removed without amputating the limb.
- **isolated hepatic perfusion (IHP)**, an open surgical procedure used to treat hepatic or liver cancers that cannot be removed with surgery. In IHP, an extremely high concentration of chemotherapy is infused into the liver by completely separating the hepatic circulatory system from the rest of the body's circulatory system.
- **percutaneous hepatic perfusion (PHP)**, a procedure similar to IHP, but considered minimally invasive because only small needle punctures in the skin are needed to access the liver, rather than a large incision.
- **hyperthermic intraperitoneal chemoperfusion (HIPEC)**, an aggressive therapy used to directly treat advanced tumors that have spread throughout the abdominal cavity and linings.



Our goal with these techniques is to enhance the patient's quality of life and prolong survival, so that patients have not only more time, but more meaningful time with their families.

—DR. DAVID BARTLETT

Doctors at UPMC's Koch Center perform more HIPEC procedures than any other cancer center in the world, with hundreds of patients treated over the past several years. "The ideal candidate for the HIPEC procedure is the patient who has tumors that have spread into, but not beyond, the peritoneal cavity," explains **David L. Bartlett, MD**, chief, Division of Surgical Oncology. These tumors grow like seeds and can literally spread thousands of tiny tumors throughout the abdominal cavity.

The HIPEC procedure begins with surgery to remove as many of the small tumors as possible; then the surgeon inserts tubes through which a high concentration of heated chemotherapy solution is circulated within and out of the body, essentially bathing the region for 100 minutes. "HIPEC is an aggressive treatment that delivers heated chemotherapy throughout the region, and the combination of heat and chemotherapy is very effective in killing cancer cells," Dr. Bartlett adds. Patients typically have few, if any, side effects normally associated with traditional chemotherapy because the medication is confined to one region of the body.

New uses for perfusion techniques also are being developed through clinical trials. A recent study of patients with ocular melanoma that has metastasized to the liver is being led by **James F. Pingpank, MD**, a surgical oncologist at UPMC Cancer Centers and a physician-researcher at the University of Pittsburgh Cancer Institute.

As a principal investigator for this Phase III trial, Dr. Pingpank worked with the manufacturer of a percutaneous hepatic perfusion (PHP) system that employs a double balloon catheter inserted during a minimally invasive procedure to seal off the arteries and veins leading to and from the liver, so that it can be isolated to receive chemotherapy. Unlike other perfusion techniques, PHP treatment can be given more than once, a crucial benefit if ocular melanoma recurs.

This study has shown great promise in treating patients whose liver metastases from ocular melanoma were previously thought to be too advanced to treat at all. More than half of the patients who received the new technique responded to the chemotherapy. Dr. Pingpank presented the results of the study at the American Society of Clinical Oncology (ASCO) annual meeting in 2010.

"Techniques such as these can have significantly positive results for many patients with difficult cancers, even those who had exhausted conventional methods of treatment," Dr. Bartlett says. "Our goal with these techniques is to enhance the patient's quality of life and prolong survival so that patients have not only more time, but more meaningful time with their families."

Peritoneal carcinomatosis is a cancer that can literally spread thousands of tiny tumors like seeds throughout the abdominal cavity.

Robotic Technology Enhancing Pancreatic Cancer Surgery

Opposite, top: The daVinci® robot allows the surgeon to control three different hands during minimally invasive surgical procedures.

Bottom: Drs. A. James Moser, left, and Herbert J. Zeh, are two of only a handful of surgeons worldwide who perform the complex robot-assisted Whipple procedure.

The surgical oncology program at UPMC Cancer Centers has expanded the scope of its surgical robotics program to include a minimally invasive form of the pylorus-preserving pancreaticoduodenectomy or “Whipple” procedure, a highly complex surgery used to treat a number of tumors of the pancreas, duodenum, and bile duct.

The Whipple continues to be the most frequently used surgical procedure to treat pancreatic cancer at UPMC Cancer Centers, with 76 percent of pancreatic cancer surgery patients receiving this approach. Until recently, patients undergoing the Whipple had an “open” procedure, which required a long incision and a six- or seven-hour operation. The surgery requires flexibility and precision that conventional laparoscopy, performed using two-dimensional, long-shafted instruments, cannot provide.

“The robotic-assisted Whipple represents the most significant innovation to the Whipple surgery that has been made in the last 80 years,” says **Herbert J. Zeh, MD, PhD**, codirector of the Pancreatic Cancer Specialty Care Center, who developed the robotic Whipple program with his partner and codirector **A. James Moser, MD**, and **David L. Bartlett, MD**, chief, Division of Surgical Oncology.

“The increased dexterity, three-dimensional vision, and ergonomics of the daVinci® robot are far superior to the traditional laparoscopic approach,” he says. “The robot allows the surgeon to control three different hands. The ability to place sutures as carefully as we can through the open procedure is the main benefit of the robot-assisted surgery, and the procedure is safe for patients and allows for a quicker recovery and resumption of their normal activities.”

Drs. Moser and Zeh are two of only a handful of surgeons worldwide who perform the Whipple using robotic surgical technology, and together have performed more than 50 robotic-assisted Whipple procedures at UPMC Cancer Centers.

“Many people with pancreatic cancer don’t seek treatment because their impression is that nothing can be done, that the disease is always fatal,” explains Dr. Moser. “Robotic surgery completely changes the equation by reducing the time of recovery and restoring a person’s health. Other components, such as radiation therapy or chemotherapy, don’t seem as daunting after robotic surgery. Robotic Whipple surgery is already helping to relieve much of the anxiety related to pancreatic cancer.”

The team recently sponsored an international conference on minimally invasive pancreatic surgery to share experiences and outcomes among the world’s experts in these procedures in an effort to expedite innovation in this rapidly evolving field.

The robot-assisted Whipple surgery is an effective option that now is available to 85 percent of patients diagnosed with operable pancreatic cancer and benign tumors or cystic premalignant lesions of the head of the pancreas.

The robot-assisted Whipple represents the most significant innovation to the Whipple surgery that has been made in the last 80 years.

—DR. HERBERT J. ZEH



All Roads Lead to Pittsburgh

One Patient's Story of Hope Despite Terminal Illness



In 1998, when **Gabriella Graham** of Salinas, Calif., was diagnosed with cancer at age 41, she had been complaining of bloating and pain in her lower right abdomen for more than three years. By the time her doctor had figured out her rare condition — mucinous adenocarcinoma of the appendix and pseudomyxoma peritonei syndrome — her cancer was already at stage IV. “I was given a prognosis of 18 months to live by my oncologists and had one ‘palliative’ surgery by my HMO,” Gabriella says. Palliative surgery is any type of operation performed on a patient whose cancer is deemed terminal — it is done not to remove all of the cancer, but rather to improve quality of life and comfort in the patient’s last months. Following the surgery, Gabriella says, “I was sent home to get my affairs in order.”

A second palliative surgery in 1999 required the removal of most of her stomach, and Gabriella was again sent home for hospice care.

When it was discovered in 2000 that she had developed a 15-pound tumor the size of a bowling ball on her liver that had also collapsed her lung, none of the appendiceal cancer surgeons she consulted would accept her case because of the risks involved. She decided to consult a liver transplant specialist, and found Rick Selby, MD, director of the Liver Transplant Program and Center for Liver Disease at the University of Southern California, who agreed to perform the difficult surgery. Gabriella did not know at that time, but later found out, that Dr. Selby had spent eight years as a faculty member at the University of Pittsburgh School of Medicine and a liver surgeon at UPMC, where he had participated in more than 700 liver

transplants. It took five liver transplant specialists 18 hours to remove tumors from both lobes of Gabriella’s liver and the majority of her pancreas, a surgery considered practically impossible at the time and still amazingly complex even today. After a long recovery, and still not cancer free, she decided to undergo experimental systemic chemotherapy.

Referred to Hospice a Third Time

After two years of chemotherapy, she found herself being referred to hospice once again. “I sought instead the services of **David L. Bartlett, MD**, at UPMC Cancer Centers. I had heard about his excellent reputation years earlier when he was at the National Institutes of Health (NIH) and was pioneering a new heated chemotherapy protocol, but I was not a candidate for the NIH protocol because of my advanced stage of disease and prior surgeries,” she says. Dr. Bartlett, who was now chief of UPMC’s Division of Surgical Oncology and director of the David C. Koch Regional Perfusion Cancer Therapy Center, felt that he might be able to “turn back the clock a few years” for Gabriella with another palliative surgery. Gabriella underwent yet another surgery, which Dr. Bartlett performed in 2004. “I returned to Dr. Bartlett and UPMC Cancer Centers in 2006 for an additional surgery to remove tumors, and that is when I had HIPEC,” Gabriella says.

Many patients who have HIPEC earlier in their diagnoses recover fairly quickly and tolerate the treatment well. But because of her prior major surgeries, the effects of many years of treatment on her body, and her lack of family or caregivers to support her, Gabriella made a slow recovery.

HIPEC

Healing By Helping Others

Part of her resolve to recover was fueled by her desire to help other patients with her same diagnosis and prognosis. Throughout her years of surgery, she had begun to amass a great deal of knowledge and resources on appendiceal cancer and pseudomyxoma peritonei (PMP).

Compiling her notes, she began to write patient newsletters and handbooks, and then began to use the Internet as a base for founding a grass-roots organization which now has become PMP Pals. Gabriella continues to serve the organization as a patient advocate, and helps match new patients with “mentors”—PMP survivors and family members who receive training to serve as positive role models for new patients. She counsels patients to seek skilled specialists for treatment of this uncommon cancer, and helps them become active in their own cancer care. “Some doctors still have the perception that HIPEC is an experimental procedure,” Gabriella says. “But now it is considered a standard treatment for metastatic gastrointestinal cancers and patients need to have surgeons who advocate for them to receive treatments that could help them.

“Since our diagnosis is so rare, patients often feel alienated when they attend local generic cancer support groups that are populated by people with more common cancers. We prefer to call our programs resource groups instead of support groups. We pride ourselves on the personal attention we share with one another, rather than being an anonymous cyberspace group. Many of our Pals have been active in our program for more than a decade.”

PMP Pals now offers one weekend-long conference that draws patients from around the world, and the organization serves patients in 47 countries and 12 languages, some of whom live in nations that lack even one specialist in the treatment of appendiceal cancer.

THIRTEEN YEARS AFTER HER INITIAL DIAGNOSIS, GABRIELLA CONTINUES TO LIVE WITH HER CANCER. AND ALTHOUGH HER JOURNEY HAS BEEN AN ARDUOUS ONE AND SHE DOES NOT HAVE THE STAMINA FOR SOME OF THE MORE PHYSICALLY DEMANDING ACTIVITIES SHE ONCE ENJOYED, SHE IS LIVING PROOF THAT ADVANCES IN CANCER CARE AND TREATMENT, SUCH AS HIPEC, ARE HELPING PATIENTS LIVE LONGER, MORE PRODUCTIVE LIVES.

“I feel that HIPEC bought me more time,” she says. “Without HIPEC, I don’t think I’d be here today. My case was very difficult because I had been chronically ill for more than a decade and had undergone six major surgeries. The majority of appendiceal cancer patients I know, including those who have had HIPEC, are leading very full and active lives and enjoy nearly every activity that they enjoyed prior to diagnosis.”

Although she does become discouraged at times coping with her illness, she tries not to let it get her down. “I don’t have time to worry about the future that much,” she says. “I have a lot of work to do while I am here and I intend to be productive for as long as possible. That’s all any of us can ask for, isn’t it?”



Gabriella Graham has used her decade-long experience with appendiceal cancer to help others with the same diagnosis. PMP Pals, the resource group she founded, now serves patients in 47 countries and in 12 languages.

A Multidisciplinary Approach to the Most Challenging Cancers

SPECIALTY CARE CENTERS

Since spring 2008, Specialty Care Centers have been launched to treat 15 different diseases in adults, including:

- brain cancer
- bladder cancer
- breast cancer
- head and neck cancers
- hematologic cancers
- liver cancer
- lung cancer
- melanoma and skin cancer
- mesothelioma
- metastatic colorectal cancer
- pancreatic cancer
- peritoneal carcinomatosis and ovarian cancer
- prostate cancer
- sarcoma
- thyroid cancer

The Specialty Care Centers

Most patients with cancer can be diagnosed, treated, and receive follow-up care at any of the UPMC Cancer Centers locations—but patients with recurrent metastases or difficult-to-treat cancers present special challenges. For those patients, the University of Pittsburgh Cancer Institute (UPCI) and UPMC Cancer Centers have developed disease-specific multidisciplinary clinics called Specialty Care Centers (SCCs), where patients can see an entire team of specialists relevant to their diagnoses in a short period of time, expediting the development and implementation of treatment plans. The SCCs also may be used by referring physicians to confirm diagnoses, second opinions, or to consult on especially difficult cases. Once seen through the SCCs, patients can be treated at the central facility or referred back to their primary oncologists for treatment.

Patients are seen at Hillman Cancer Center by a multidisciplinary team of physicians, including medical, radiation, and surgical oncologists, and affiliated specialists, such as gastroenterologists, pulmonologists, psychologists, genetic counselors, and other support specialists. The team evaluates the patient, reviews diagnostic testing, and meets to discuss each patient's case to determine the best course of action for treatment. Treatment strategies are developed in collaboration with referring physicians and, through the UPMC Cancer Centers community network, delivery of follow-up care may be available close to home.

Clinical trials are considered as part of the treatment strategy, and patients who meet eligibility requirements are enrolled in trials through the SCCs. Newly diagnosed patients work with a nurse coordinator who serves as the point person for the treatment team—reviewing the patient's history and making appropriate appointments based on the patient's needs and the team's recommendations. Specialists from supportive services, such as nutritional counseling, behavioral medicine, palliative care, rehabilitation, oncology social work, and cancer education, also are part of the multidisciplinary team to enhance the patient experience and optimize the research opportunities.

Spotlighting the Pancreatic Cancer Specialty Care Center

For pancreatic cancer patients, the traditional route to a definitive diagnosis and treatment plan often is circuitous. Not only is the cancer diagnosis difficult enough to receive, but the process of making numerous visits to different specialists and appointments for different tests often delays the definitive treatment of the disease.

The multidisciplinary evaluation approach of the Pancreatic Cancer SCC offers patients with pancreatic cancer a full spectrum of evidence-based recommendations for surgery, neoadjuvant, and/or adjuvant chemotherapy, radiation therapy, pain



management, psychological counseling, prevention of malnutrition, and access to clinical research.

Like patients in the other SCCs, pancreatic cancer SCC patients are evaluated by a team of specialists in a single visit at Hillman Cancer Center. The findings of all the team members are reviewed comprehensively by the multidisciplinary panel, and a treatment plan is generated based on the evidence-based Clinical Pathway for pancreatic cancer established by the specialist team and implemented across the UPMC Cancer Centers network.

Measureable Results

Not surprisingly, a comparison of the traditional method of diagnosing and treating pancreatic cancer with the multidisciplinary approach of the Pancreatic Cancer SCC showed that the organized, comprehensive approach improves patient care and satisfaction. Between March and December 2009, 154 new patients were evaluated. Clinical stage at presentation included Stage I (<1 percent), Stage II (26 percent), Stage III (34 percent), and Stage IV (31 percent).

More than 95 percent of patients were satisfied with their evaluation process and the efficiency of the multidisciplinary process—and improved turnaround time to patient care. The average time from initial evaluation to starting definitive oncologic care was decreased by nearly two-thirds, as compared to the time before the implementation of this multidisciplinary center.

Crossing the Pond to Provide International Cancer Care

As UPMC Cancer Centers continues to broaden its clinical network throughout western Pennsylvania, cancer care has become the focal point of an international growth strategy as well. Through UPMC's International and Commercial Services Division, UPMC Cancer Centers has exported its considerable expertise in cancer care, advanced technologies, and operations to two facilities in Ireland, and is currently looking for additional opportunities to add to its growing international portfolio.

UPMC Beacon Hospital, Dublin, Ireland

UPMC Beacon Hospital offers a full spectrum of community oncology services. Specialists in the surgical treatment of colorectal, breast, thoracic, urologic, and gynecologic oncology work in collaboration with a team of medical and radiation oncologists located at the hospital's main campus in Sandford, Dublin. On-site medical oncology services include palliative medicine and complementary care, an outpatient oncology unit, and a 27-bed dedicated oncology inpatient ward. Treatment protocols are based on UPMC Cancer Centers' Clinical Pathways, and utilize multidisciplinary team meetings coordinated between Dublin- and Pittsburgh-based oncology experts. UPMC Beacon offers on-site radiation oncology services, including IMRT treatment planning, is the only center in Ireland with stereotactic radiosurgery capability, and is a national referral site for public patients requiring the service.

In 2010, UPMC Beacon Women's Health Centre was opened, providing access to the only private hospital-affiliated breast cancer center in Dublin. Also that year, UPMC Beacon partnered with St. Luke's public hospital to launch clinical trials, and established a brachytherapy program which linked services between the Beacon cancer center in Dublin and UPMC's other cancer center in Waterford, Ireland.

UPMC Whitfield Cancer Centre, Waterford, Ireland

UPMC Whitfield Cancer Centre is the sole provider of radiotherapy services in southeast Ireland. Through a service-level agreement with the Irish public health services, the cancer center provides access to both public and private patients. UPMC Whitfield offers IMRT treatment planning and PET/CT services on-site. In 2010, UPMC Whitfield Cancer Center affiliated with Waterford Regional Hospital to launch clinical trials.

Expanding to Other Countries

In 2008, UPMC and GE Healthcare International (GEHC) agreed to collaborate on the development of cancer centers in the international market. UPMC would open and run the operations, while GEHC would provide the technology and equipment to the cancer centers. This partnership, called the GE UPMC Oncology Initiative, is anticipated to open 25 cancer centers over the next decade.

Another Route to Superior Care

Magee-Womens Cancer Program of UPMC Cancer Centers

The women's oncology program consists of two distinct cancer services—one dedicated solely to gynecologic cancers and the other to breast cancer. Both programs use a multidisciplinary team of gynecologic oncologists, medical oncologists, surgical oncologists, radiation oncologists, radiologists, pathologists, research and behavioral scientists, and clinical staff to provide patients with the most comprehensive care available.

Breast Cancer Program

Magee provides breast imaging services at eight Womancare Centers located throughout western Pennsylvania. Among the tests offered are digital mammography, computer-aided detection (CAD), and ultrasound. Breast MRI, MRI-guided needle biopsy, ductoscopy, and sentinel node biopsy are performed at Magee, while outpatient breast cancer surgery is necessarily concentrated at clinical sites that have direct access to imaging, which include UPMC Monroeville Surgery Center, UPMC South Surgery Center, and Magee. The Magee Comprehensive Breast Program at UPMC Horizon also provides breast diagnostic and treatment services in Hermitage, Pa.

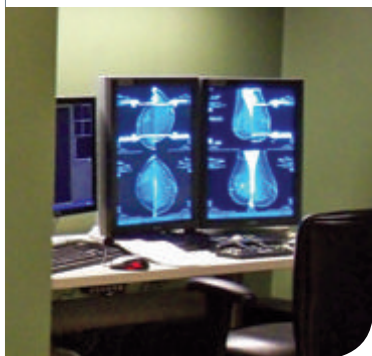
A strength of Magee-Womens Breast Cancer Surgical Services is the use of advanced surgical techniques to improve patient outcomes from both a health and cosmetic standpoint. Such advances as nipple-sparing and skin-sparing mastectomies, microvascular breast reconstruction, and sentinel lymph node mapping can be effective in removing cancers while preserving as much breast tissue as possible.

A full array of post-surgical services is available, as well, including medical oncology, lymphedema management, pain management and palliative care, and radiation oncology.

Gynecologic Cancer Program

The Magee-Womens Gynecologic Cancer Program of UPMC Cancer Centers serves as the focal point of clinical care for the full range of gynecologic cancers, providing the latest treatments and therapies to serve women throughout all phases of their disease. Based at Magee, it offers the latest advances in detection, diagnosis, and treatment of cervical, endometrial, and ovarian cancers, as well as new prevention strategies.

Access to gynecologic oncology services is provided at Magee in Oakland, Hillman Cancer Center in Shadyside, UPMC Passavant in the North Hills, and UPMC Mercy in downtown Pittsburgh, as well



Top: Because of the higher quality of its images, digital mammography is always used at Magee-Womens Hospital of UPMC and all of the Magee Womancare Centers.

Bottom: Mammography is one of the best ways to screen for breast cancer. It can find tumors that are too small for a woman or her health care provider to feel.

Women's Oncology

A strength of Magee-Womens Breast Cancer Surgical Services is the use of advanced surgical techniques to improve patient outcomes from both a health and cosmetic standpoint.

as at 15 additional community locations covering the entire region through partnerships with UPMC obstetrician-gynecologists, primary care, and cancer care physicians.

Referrals to the Magee-Womens Breast Cancer or Gynecologic Cancer programs can come from anywhere throughout the UPMC Cancer Centers network. Patients can receive surgery and chemotherapy or radiation therapy treatments all at the same site, or receive surgery at any of the surgery centers and treatment at any UPMC Cancer Centers community site. Patients receive the same Clinical Pathways standards of care regardless of where they register or enter treatment in the network, and can access clinical trials for breast cancer or ovarian cancer at Magee, Hillman Cancer Center, or the UPMC Cancer Centers community sites. Clinical trials for other gynecologic cancers soon will be available at community sites, as well.

Magee also operates two high-risk programs — the High-Risk Breast Cancer and High-Risk Ovarian Cancer programs — out of Hillman Cancer Center's Women's Specialty Center. Conveniently located adjacent to the breast imaging suite at Hillman, the clinics enable specialty-trained physicians and nurses to provide risk assessment, surveillance, counseling, and genetic testing for women who are identified as high-risk for these cancers.

Breast Imaging

Magee's extensive network of community diagnostic facilities provides the latest technology delivered by trained, compassionate radiologists and technologists. Specialized nurses evaluate and monitor patients undergoing interventional procedures to ensure their safety and comfort. If treatment becomes necessary, women can be referred to surgeons and medical oncologists at Magee, Hillman Cancer Center, and the UPMC Cancer Centers network. Women who are without insurance or unable to pay are offered free mammogram vouchers through a variety of organizations including Susan G. Komen for the Cure,[®] and other private foundations.

Women's Cancer Research

Women's cancer research is centralized at the Womens Cancer Research Center (WCRC), a joint venture of the Magee-Womens Research Institute (MWRI) and the University of Pittsburgh Cancer Institute (UPCI). Here, basic and translational research on breast and gynecologic cancers is ongoing.

MWRI participates in UPMC's Health Sciences Tissue Bank, and serves as the main repository of tissues for breast and gynecologic cancers.

Many clinical trials for medical oncology, radiation oncology, and surgical oncology treatments and techniques are developed

BREAST CANCER CASES BY THE NUMBERS*

At Magee there were:

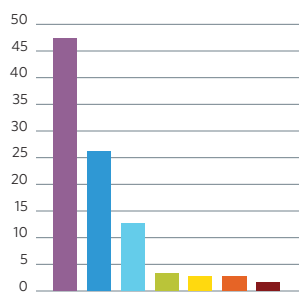
- 989 cases of invasive breast cancer
- 256 of in situ/non-invasive breast cancer
- 3 cases of borderline tumor breast cancer cases newly diagnosed and/or treated,
- a total of 1,248 analytic breast cancer cases
- 30 percent of breast cancer patients were in the 50 to 59 age group, followed by 24 percent in the 60 to 69 age group and 20 percent in the 40 to 49 age group
- 60 percent of breast cancer patients were diagnosed with Stage 0 (non-invasive) and Stage I disease; 28 percent were Stage II; 8 percent were Stage III; and 3 percent were Stage IV

* As of 2009

MAGEE-WOMENS CANCER CASES BY CANCER SITE*

- Breast (1,308 total cases)
- Gynecologic (710 total cases)
- Skin, Melanoma (357 total cases)
- Genitourinary (100 total cases)
- Digestive (80 total cases)
- Other (72 total cases)
- Respiratory (51 total cases)

By percentage



* As of 2009

Josie van Londen, MD, MS, is a medical oncologist at the Women's Cancer LiveWell Survivorship Center, Magee-Womens Hospital of UPMC, which supports the special medical, psychological, nutritional, and physical therapy needs of breast and gynecologic cancer survivors.

at Magee-Womens Hospital before being implemented at the community sites. Currently, WCRC physician-scientists are engaged in novel treatments, such as use of the poly ADP ribose polymerase (PARP) inhibitor ABT-888 as a single agent for patients with BRCA 1 or BRCA 2 genetic mutations or dysfunctions; hyperthermal intraperitoneal chemotherapy (HIPEC) applications for gynecologic cancers; and robotic applications for gynecologic oncology surgery, to name just a few.

Making Inroads for Patient Needs

Magee maintains a patient- and family-centered care philosophy and relies upon input from these key stakeholders to improve its service offerings. Regularly scheduled patient advisory groups provide feedback on patient experiences, driving

key quality improvement initiatives. Some of the services that have resulted from this feedback include:

- same-day breast biopsy services
- patient navigator services to guide patients to the appropriate treatment areas
- web-based patient-education videos
- patient-education materials on diagnostic tests, surgeries, and care maps describing each visit

In addition to providing more patient-friendly services, a full program has been developed to meet the unique needs of breast and gynecologic cancer survivors at the LiveWell Survivorship Center. The Center provides specialized expertise on important breast or gynecologic cancer survivor-related topics, such as surveillance for recurrence, prevention, management of the short- and long-term effects of treatment, lifestyle, adjustment to life after cancer, and coordination of care. The LiveWell Survivorship Center accommodates the longer appointments that may be required at this stage in treatment and provides access to oncologists, as well as nutritional, physical therapy, and psychological services. The Center also provides workshops, conferences, and other educational and support events.



Cancer Care to Span a Lifetime

Pediatric Hematology-Oncology at Children's Hospital of Pittsburgh of UPMC

UPMC Cancer Centers also collaborates closely with its partners at Children's Hospital of Pittsburgh of UPMC to offer outstanding cancer care to children in the region and beyond.

Children's Hospital's Division of Pediatric Hematology-Oncology is the only medical center in the western Pennsylvania region that provides comprehensive care for the diagnosis, treatment, and complete follow-up of children, adolescents, and young adults with hematologic and oncologic disorders.

Each year, Children's receives more than 1,000 admissions to its dedicated inpatient cancer unit, including approximately 150 newly diagnosed patients. More than 8,100 outpatient clinic visits take place for patients to receive treatment and follow-up care in the uniquely family-friendly environment of the Marty Ostrow Hematology-Oncology Outpatient Center. The hospital has expert clinicians in oncology, sickle cell disease, hemostasis, and stem cell transplantation to provide state-of-the-art care to children with blood diseases and cancer.

Newly developed outreach programs have expanded Children's Hospital's hematology consultation services to the Wheeling, W.Va., and Hermitage, Pa., regions.

Research and Clinical Trials

Children's is actively involved in clinical hematology and oncology research, as well as basic research in the areas of cancer etiology, immunology, stem cell biology, and molecular oncology. One focus of our bench research is on the understanding

The new, state-of-the-art Children's Hospital of Pittsburgh of UPMC facility is among the first fully digital hospitals in the country. Designed as a "green" campus, the new hospital includes 296 licensed beds within nine floors of inpatient and outpatient care areas; a 10-story, 300,000-square-foot research facility; a 130,000-square-foot faculty office building; and a 75,000-square-foot administrative office building.



A diagnosis of cancer brings with it tremendous implications for the patient, the parents, and siblings. To help families cope, every new cancer patient is assigned a psychosocial team that consists of a social worker, psychologist, and child life specialist to anticipate potentially stressful situations and help the family manage them successfully.



of some of the cellular modifications induced by overexpression of the c-Myc oncoprotein that ultimately result in development of tumors. Another focus is on immunologic cell signaling in Wiskott-Aldrich syndrome, a life-threatening childhood disease. Our research on this syndrome was recently featured on the cover of *Science Translational Medicine*.

Children's Hospital is a longtime member of the Children's Oncology Group (COG), the National Cancer Institute (NCI)-sponsored pediatric oncology trials group. The COG encompasses more than 200 children's cancer centers and is made up of experts from around the world who are dedicated to improving the knowledge and treatment of childhood cancer. Many physicians at Children's are leaders in the COG and are active in developing new cancer treatment strategies, thereby ensuring that Children's offers state-of-the-art therapy to children with all forms of childhood cancer. There are more than 100 active COG protocols open at Children's Hospital and the division has more patients enrolled in clinical trials than 93 percent of the nation's other pediatric oncology programs.

Children's is among only 20 COG-member institutions in the country eligible to perform Phase I clinical trials—the earliest stage of clinical trials—which enables Children's to offer patients experimental studies with new drugs and treatments for cancer. Children's also is a member of the Pediatric Brain Cancer Consortium, Children's Cancer Survivor Study, Pediatric Blood and Marrow Transplant (BMT) Consortium, and the BMT Clinical Trials Network of the NIH.

Collaboration

Partnership with the University of Pittsburgh Cancer Institute also allows the hospital to enroll eligible cancer patients in a wide variety of treatment studies and clinical protocols. In fact, between 30 to 40 percent of Children's Hospital's oncology-hematology patients are enrolled in clinical trials—almost ten-fold higher than their adult counterparts.

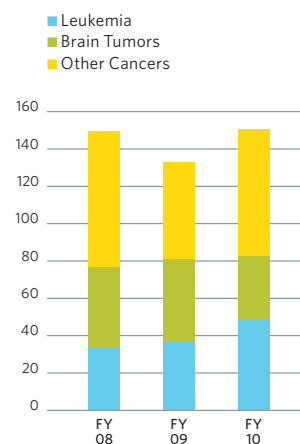
Children's also is partnering with UPMC Cancer Centers in a palliative care program, which has been mutually beneficial. The palliative care team works with the medical ethics service to treat pain symptoms and ease suffering, even if the patient's underlying disease cannot be cured.



Above: Pediatric radiation therapist April Scarberry, RT (R) (T), readies the linear accelerator at Children's Hospital of Pittsburgh for a patient's radiation oncology treatment. The room's seashore-themed decor has made the linear accelerator machine less intimidating for kids.

Opposite: Pediatric oncology child life specialists like Laura McCullough, MS, CCLS, play a critical role in assessing the specific needs of children and teens with cancer while they are inpatients at Children's Hospital.

CHILDREN'S HOSPITAL NEW CANCER PATIENTS



PediatricOncology

Bridging Childhood and Adulthood



AYA Oncology Program staffers organize regular get-togethers — such as this winter tubing outing — for teen oncology patients to encourage peer support and build friendships in a non-medical environment.

Children's Hospital's Adolescent and Young Adult (AYA) Oncology Program

Adolescence can present some rocky terrain for any young person — and a cancer diagnosis can make it an even tougher journey. But an innovative treatment program geared especially toward the 15- to 21-year-old age group is helping to make at least the cancer part of the path a little easier to navigate.

The Adolescent and Young Adult (AYA) Oncology Program within the Division of Pediatric Hematology-Oncology at Children's Hospital of Pittsburgh of UPMC is the region's only cancer treatment program specifically designed to meet the needs of this particular age group.

NO LONGER CHILDREN BUT NOT YET ADULTS, ADOLESCENT PATIENTS STRADDLE THE FINE MEDICAL LINE BETWEEN BEING TREATED WITH ADULT TREATMENT REGIMENS IN ADULT HOSPITALS AND WITH REGIMENS DESIGNED FOR CHILDREN IN PEDIATRIC HOSPITALS.

Research indicates that adolescents and young adults may have better outcomes when treated in pediatric medical oncology facilities than in adult facilities, even on the same treatment regimens, especially those who have common children's malignancies, such as acute lymphoblastic leukemia (ALL) and Ewing's sarcoma. In fact, data shows that patients ages 20 to even 45 years have better outcomes when their acute lymphoblastic leukemia is treated according to pediatric treatment regimens rather than less intense adult ones.

Working with adult medical oncologists, pediatric oncologist **Peter H. Shaw, MD**, director of the AYA Oncology Program, developed this program in 2006 to provide services that focus not only on the medical needs of adolescents but on their unique and complex psychosocial needs as well. Benefits of this innovative program include:

- **better compliance with treatment regimens** — Young people with cancer comply better with therapy delivered through the family-centered approach of a children's hospital.
- **contraception guidance and fertility preservation services** — The AYA program provides support for the special reproductive concerns of this age group.
- **support groups** — The AYA program provides expert and peer support to help young people cope with financial, workplace, relationship, and body-image issues.
- **tutoring services and school/career counseling** — AYA patients receive help to maintain their grades, continue their studies, and plan for their futures.
- **surveillance for late effects of cancer therapy and long-term follow-up care** — The AYA program is part of a national program with the Children's Oncology Group (COG) to follow patients whose cancers are cured and to study the late effects of their disease as they age.

PediatricOncology

Perhaps the most important advantage of the AYA program is the enhanced collaboration it has produced between AYA physicians and University of Pittsburgh Cancer Institute (UPCI) adult oncology physicians-researchers. From the outset, this collaboration yielded mutually beneficial results for patients at both the pediatric and adult ends of the spectrum. Young patients treated through Children's AYA program are able to access the appropriate clinical trials at UPCI and at Children's.

STUDIES HAVE SHOWN THAT INCREASED ENROLLMENT IN CLINICAL TRIALS HAS A DIRECT CORRELATION TO IMPROVED CURE RATES. DR. SHAW PRESENTED HIS DATA SHOWING IMPROVED CLINICAL TRIAL ENROLLMENT OF PATIENTS IN THIS AGE GROUP AS A RESULT OF THE AYA PROGRAM AT THE ANNUAL AMERICAN SOCIETY OF CLINICAL ONCOLOGY (ASCO) CONFERENCE IN JUNE 2010 AND INTENDS TO PUBLISH HIS FINDINGS IN THE NEAR FUTURE.

"Our own published data had shown that, prior to collaboration, only a small percentage of adolescent patients treated at UPCI were enrolled in clinical trials for their cancers, compared with more than a quarter of patients treated at Children's," Dr. Shaw says. "After several years of building a strong collaborative relationship with physician-researchers at UPCI and UPMC Cancer Centers, we've increased the clinical trial accrual in this age group to a third of the patients treated at a UPMC adult facility on whom we collaborated, while maintaining

the same rate of clinical trial accrual at Children's for this age group. The main result is that we're helping more patients by learning from each other."

The AYA Program also is collaborating with Magee-Womens Hospital of UPMC to investigate fertility preservation for even younger patients prior to undergoing chemotherapy or radiation therapy. This experimental program is looking at novel ways to freeze the cells of prepubescent patients for their use in starting families years down the road.

Dr. Peter H. Shaw directs the AYA Oncology Program, geared specifically toward the 15- to 21-year-old age group.



The Critical Connection

Patient Safety and Quality Improvement

At UPMC Cancer Centers, ensuring the quality of the health care and safety of patients are of utmost importance.

Our vision of quality and safety is that we treat the right patient, with the right care, in the right way, at the right time — every time.

The Right Patient

Our responsibility for treating the right patient goes beyond simply ensuring that we have identified the correct patient. Once the patient is diagnosed, measures are initiated to immediately connect the patient to the appropriate cancer specialist or multidisciplinary team of specialists. Then we facilitate the flow of communication between patients and their providers and within the care team itself to ensure each patient receives the proper course of treatment.

The Right Care

We treat patients with cancer using evidence-based clinical care that considers the best practices and the latest data to design the safest, most appropriate, and most individualized plans of care. Our Clinical Pathways program, outlined on page 20 of this report, enables us to constantly update our guidelines to provide a single standard of care to patients throughout the UPMC Cancer Centers network. In addition, our clinics and

hospital affiliations follow a rigorous regimen of patient safety protocols as outlined by the National Institute for Occupational Safety and Health (NIOSH), the American Society of Health System Pharmacists (ASHP), The Joint Commission (TJC), and the Department of Health.

The Right Way

UPMC Cancer Centers embraces a culture of service that begins with a patient's first visit, and continues through to follow-up care long after treatment is complete. In between visits, our commitment to 360-degree support comes in the form of concierge services, patient education, behavioral services, and many other support services made available to our patients. The expert physicians and nursing staff in medical oncology, surgical oncology, and radiation therapy work in collaboration to answer questions or address concerns patients may have about their treatment or diagnosis.

The Right Time

We are committed to providing patients with the best access to our services by providing easy appointment scheduling, quick turnaround on test results, and convenient locations that increase ease of access to care. With our vast network of 38 sites throughout western Pennsylvania and eastern Ohio, patients are able to receive exceptional care and innovative treatments closer to home.

Patient Safety

UPMC Cancer Centers is committed to providing patient-centered, individualized, safe, and convenient clinical experiences for each and every patient, each and every time they visit.

As an academic institution, UPMC Cancer Centers provides our physicians with ongoing education to maximize their awareness of the current literature, research findings, and innovative therapies available in the field of oncology and hematology.

OUR GOAL IS TO PROVIDE THE SAFEST PATIENT CARE ENVIRONMENT POSSIBLE, WHICH HAS RESULTED IN IMPLEMENTATION OF:

- a process for scheduling multiple-day treatment regimens
- an automatic visual injection pop-up reminder within the computerized scheduling system
- patient armbands to assist with the patient identification process
- an electronic patient management calendar system for tracking outpatients who are receiving oral chemotherapy agents, as well as outpatients who require specialized lab monitoring

UPMC CANCER CENTERS IS CONTINUOUSLY IMPLEMENTING SPECIFIC QUALITY IMPROVEMENT INITIATIVES, SUCH AS:

- participating in annual didactic and skill revalidation programs, required for nursing staff who are administering chemotherapy and biological therapy
- transforming our palliative care through advanced directives and supportive services
- measuring the patient experience through internal and external sources (Press Ganey satisfaction surveys, patient advisory groups, and internal clinic process

evaluation), global initiatives, as well as site-specific endeavors including:

- > enhancing the patient experience through formalized initiatives such as the Seamless Patient Care initiative, a program designed to promote collaboration among care providers and patients, with emphasis on coordination of care, minimized patient wait times, and increased access to support services
- > improving patient satisfaction through the “dignity robe” program for patients treated with radiation
- focusing on a formal medication-adverse events review process to ensure appropriate safety mechanisms with an emphasis on cause analysis and action plan development
- regularly updating staff policies and procedures, and creating customized internal databases to track and document adverse effects, even those that are so minor we are not required to report them
- taking proactive safety measures to minimize the risk of future adverse effects
- utilizing a multidisciplinary team of specialists to capitalize on the collective knowledge and insight of our most talented specialists
- participating in the American Society of Clinical Oncology’s Quality Oncology Practice Initiative, an effort to promote excellence in cancer care by understanding our current state of quality delivery and providing a framework for quality improvement



Evidence-based protocols called Clinical Pathways help reduce variability in patient treatment to ensure that standards of care are uniformly adopted by all oncologists within the UPMC Cancer Centers network.



Measuring Cancer Care Performance

In 2005, the Commission on Cancer (CoC) of the American College of Surgeons, in conjunction with the American Society for Clinical Oncology and the National Comprehensive Cancer Network, developed a standard set of measures for breast cancer and colorectal cancer. The goal of these standards was to empower clinicians, administrators, and other health care staff to work collaboratively to identify problems in practice and delivery, and to implement best practices that would diminish disparities in care across CoC-approved cancer programs. The resulting measures enable hospitals to compare their care for these patients to that of other providers and allow health care consumers to review and compare the outcomes of individual cancer centers against national and state averages.

Hospital-based cancer centers have registries which document cancers diagnosed at their facilities, and all cancer registry data elements are nationally standardized. Each of these measures was developed by the CoC with the expectation that cancer registries would be used to collect the necessary data to assess and monitor in accordance with these measures. Using information routinely captured by hospital-based cancer registries and reported to the National Cancer Data Base (NCDB), the Cancer Program Practice Profile Reports, or CP3R, were developed.

The web-based CP3R gives local providers access to comparative information to assess adherence to and consideration of standard-of-care therapies for major cancers.

Quality

UPMC Cancer Centers' performance consistently exceeds both state and national rates for all six benchmarks of quality cancer care based on the latest data available (2008).

Cancer Program Practice Profile Reports (CP3R) for Breast, Colon, and Rectal Cancers¹

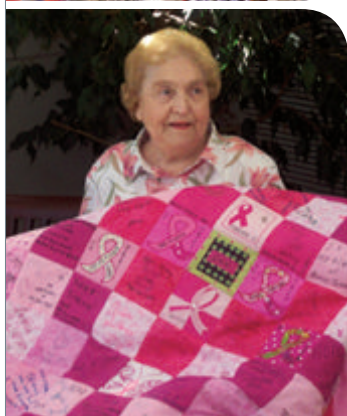
| Breast, Colon, and Rectal Measures | 2008 Performance Rates | | |
|---|------------------------|-----------------|--------------------------------|
| | All CoC Programs | PA CoC Programs | UPMC CoC Programs ² |
| BREAST | | | |
| Radiation therapy is administered within 1 year (365 days) of diagnosis for women under age 70 receiving breast conserving surgery for breast cancer. [BCS/RT] | 80.4% | 83.2% | 96.3% |
| Combination chemotherapy is considered or administered within 4 months (120 days) of diagnosis for women under 70 with AJCC T1c N0 M0, or Stage II or III hormone receptor negative breast cancer. [MAC] | 80.7% | 81.2% | 94.6% |
| Tamoxifen or third generation aromatase inhibitor is considered or administered within 1 year (365 days) of diagnosis for women with AJCC T1c N0 M0, or Stage II or III hormone receptor positive breast cancer. [HT] | 69.2% | 68.9% | 92.8% |
| COLON | | | |
| Adjuvant chemotherapy is considered or administered within 4 months (120 days) of diagnosis for patients under the age of 80 with AJCC Stage III (lymph node positive) colon cancer. [ACT] | 83.8% | 86.0% | 95.5% |
| At least 12 regional lymph nodes are removed and pathologically examined for resected colon cancer. [12RLN] | 79.7% | 77.8% | 86.8% |
| RECTAL | | | |
| Radiation therapy is considered or administered within 6 months (180 days) of diagnosis for patients under the age of 80 with clinical or pathologic AJCC T4N0M0 or Stage III receiving surgical resection for rectal cancer. [AdjRT] | 86.8% | 84.3% | 100.0% |

¹ As of 12/08/2010 posting

² UPMC CoC-approved programs include:

UPMC Horizon, Magee-Womens Hospital of UPMC, UPMC Northwest, UPMC Passavant, UPMC Presbyterian-Shadyside-Hillman, and UPMC St. Margaret

Connecting People to Information and Cancer Care



Top: Cancer survivors, wearing their purple “survivors” t-shirts, embark on the Natrona Heights Relay For Life, a fundraising walk to benefit the American Cancer Society. Staff from UPMC Cancer Center, Natrona Heights, participated in the event and raised more than \$3,500 through sales of food and baked goods, and pledges.

Bottom: Breast cancer survivor Eileen Skelly holds the “Warrior Quilt” she won in a drawing among cancer survivors at the John P. Murtha Regional Cancer Center in Johnstown, Pa. The quilt was one of 18 that were hand-sewn by volunteers out of individual patches made by cancer survivors and family members during the Mother’s Day 2010 Race for the Cure in Pittsburgh.

Community outreach at the University of Pittsburgh Cancer Institute (UPCI) and UPMC Cancer Centers comes in two important and distinctly different forms: donated services and supplies in support of community agencies and organizations and a formal program of cancer education and control services.

Community Event and Activity Support

Spreading the word about cancer prevention and detection is a mission that UPCI and UPMC Cancer Centers takes seriously. Each of the 38 individual sites within the UPMC Cancer Centers network is extremely proactive in building and maintaining close working relationships with their local community agencies and partners with these agencies in many events and activities year-round. Support for these events and activities may come in the form of donated staff hours, supplies, and materials, meeting sites, and program underwriting. Support often is a two-way endeavor: UPMC Cancer Centers works with these agencies to provide speakers, sponsor events, and educate the public on cancer topics, but also may receive funding support from these agencies in the forms of fellowships and grants for patient services, such as mammogram vouchers.

Among the many groups with which UPCI and the UPMC Cancer Centers partners are Susan G. Komen for the Cure, the National Ovarian Cancer Coalition, the American Cancer Society, the Glimmer of Hope Foundation, the Young Women’s Breast Cancer Awareness Foundation, and The Leukemia and Lymphoma Society.

Each year, UPCI and UPMC Cancer Centers provide materials and support services to numerous community agencies, and reach thousands of people through their community outreach efforts. UPMC Cancer Centers employees participated in many local health fairs, benefit activities, screenings, and presentations at a variety of sites, including malls, in the workplace, charitable runs/walks, and other cancer-related events. These types of activities may be coordinated as volunteer projects, through which professionals and other staff members donate their time and talents to participating in the event, or as UPMC Cancer Centers-sponsored projects, through which employees participate during normal work hours as a part of their assigned duties.

CommunityOutreach

SOME OF THESE OUTREACH PROJECTS INCLUDE:

- **Look Good...Feel Better** — This program of the American Cancer Society helps men, women, and teens learn how to deal with the skin changes and hair loss that often accompany cancer treatment. UPMC Cancer Centers offers regularly scheduled Look Good...Feel Better workshops year-round at eight Pittsburgh-area UPMC Cancer Centers locations, and in every region served by the network.
- **community cancer screening events** — UPMC Cancer Centers provides screening materials and staff for more than 50 community cancer screening events in the many neighborhoods throughout Pittsburgh and the western Pennsylvania region.
- **support groups** — Meeting space, clerical and staffing support, and expert speakers are provided for numerous support groups, conferences, and workshops focused on patients, family members, and caregivers. Most support groups are organized by specific cancer types to provide common experiences and build camaraderie among participants.
- **survivorship programs** — Cancer survivors may access special events and activities or may join formal survivorship programs, such as Magee-Womens Hospital of UPMC's LiveWell Survivorship program, which provides education, support, and cancer follow-up services geared specifically toward their needs.
- **blood drives for Central Blood Bank** — UPMC Cancer Centers may provide organizational and staff support for blood drives, as well as blood collection locations and supplies.
- **other community initiatives provided by individual UPMC Cancer Centers** — such as patient transportation, dietitian and nutrition counseling, and social services.

Cancer Education and Control Services

Consistent with its NCI designation as a Comprehensive Cancer Center, UPCI and its partner in clinical care, UPMC Cancer Centers, are committed to reducing the burden of cancer through a focused approach to cancer education, risk reduction, early detection and screening, reducing barriers, and research.

To further advance this mission and to provide a depth of service that health fairs and screenings alone could not provide, UPCI and UPMC Cancer Centers established its Cancer Control Services program in 2005. The program is headed by **Lyn Robertson, DrPH, RN, MSN**, associate director of Cancer Control Services, and operates with a full-time staff of two outreach coordinators.

Cancer Control Services targets the population at large, but gives special emphasis to reaching underserved populations — such as the uninsured and underinsured, minorities, seniors, the homeless and those living in transitional housing, people in rural areas, and persons with mental and/or physical challenges.

CANCER CONTROL SERVICES

2010 by the numbers:

Children reached by Healthy Choices for Students program

- during the school year: 11,948
- during the summertime: 7,017

Adults reached: 9,300

Counties in which summer programs were held: 7

School districts where the program was presented: 31

Participants in programs with Health Care for the Homeless: 150

Participants at health and wellness programs: 4,500





This educational program starts at the grassroots level to reach both children and adults with information and tangible skills to encourage healthy lifestyles.

Youth programs include the Healthy Choices program, an initiative for students in grades 1 through 9 throughout Allegheny and surrounding counties. Students may receive the Healthy Choices message through health or science classes, or as part of their after-school activities programs. The lessons are interactive and age appropriate, and may include topics such as the importance of physical activity and a healthy diet, as well as avoiding unhealthy habits, such as cigarette and smokeless tobacco use. Summer youth programs are offered at community pools and recreation centers, where the message may also reach parents, and may include topics such as skin care and sun safety.

Adult programs usually are cancer-focused, such as lectures on spotting early signs and symptoms of common cancers, or promote healthy lifestyle choices, such as weight management, good nutrition, exercise, and avoiding tobacco, and may include cancer screenings. Cancer Control Services also collaborates with the Center for Environmental Oncology to provide evidence-based education related to environmental risks for cancer, such as pesticides, second-hand smoke, plastics, and personal care products with cancer-causing ingredients.

MANY TYPES OF SCREENINGS ALSO ARE OFFERED TO TARGET POPULATIONS, WHO MAY NOT RECEIVE REGULAR CHECK-UPS, INCLUDING:

- **breast services** — clinical breast exams, scheduling mammograms, and obtaining free mammogram vouchers, if needed
- **prostate screenings** — prostate-specific antigen (PSA) tests and digital rectal exams
- **colorectal screening** — hemoccult tests and colonoscopy appointment coordination
- **cervical cancer screening** — Pap and human papillomavirus (HPV) tests
- **oral cancer and skin cancer screenings** — visual exams of the mouth and skin

To prevent them from falling through the cracks, clients are assisted by Cancer Control Services' staff in setting up appointments and are tracked until results have been provided or further diagnostic testing has been scheduled and completed. Those who receive positive findings on screenings are contacted personally by phone, and all those tested receive written results of their screenings.

Cancer Control Services also offers regularly scheduled programs to reach targeted populations through community agencies across western Pennsylvania, including Health Care for the Homeless, Gilda's Club, YWCA, Salvation Army, Greater Pittsburgh Community Food Bank, and the Carnegie Libraries of Pittsburgh, as well as through local churches, beauty and nail salons and academies, and residential treatment centers.

CommunityOutreach

In Fiscal Year 2010, Cancer Control Services reached more than 9,300 adults who had not been reached by other outreach activities.

To make it easier for underserved populations to access information and the UPMC Cancer Centers system, the Cancer Control Services program maintains a dedicated phone number and, through referral, can help patients schedule appointments, obtain medical coverage, locate medical homes, and find transportation.

In Fiscal Year 2010, Cancer Control Services reached more than 9,300 adults who had not been reached by other outreach activities.

Bridging the Gap to Research

Another important component of the Cancer Control Services program is its contribution to research, particularly in increasing minority patient enrollment in clinical trials. Enrolling racial and ethnic minority patients in clinical trials traditionally has been a challenge, because minorities may lack sufficient access to health care and clinical trials, are not reached with information on the benefits of enrollment in these studies, or may not be eligible because of existing serious medical issues at the time of cancer diagnosis.

To help reach greater numbers of minority patients, Cancer Control Services developed its Diversity Program in March 2007 and, since its inception, more than 430 newly diagnosed African Americans have been registered. A culturally sensitive patient navigator is available on-site at Hillman Cancer Center to assist minority patients with their particular needs.

An added research benefit is the Cancer Control Services program's ability to reach large groups of people and perform recordkeeping, and its database of screened people who did not have cancer, called the Healthy People Registry, was developed in 2006. In 2007, the database was expanded to include cancer survivors. This anonymous database, which now includes 1,600 individuals, provides important insights into the health of targeted populations, as well as a registry that can be used by UPCI investigators in research projects.

Dr. Lyn Robertson, associate director of Cancer Control Services, counsels young people on the dangers of smoking and uses a "contract" and personal follow-up to help them kick the habit successfully.



Staying One Step Ahead of Cancer

Professional Education Programs

Cancer care is constantly evolving due to changes in treatment and diagnosis. Helping oncology health care professionals stay current with the latest information is critical to keeping ahead of the learning curve. UPMC Cancer Centers maintains a Professional Education Department devoted specifically to this mission.

In 2009, there were 132 programs presented at various locations, with an attendance of nearly 4,000 professionals, including all the network cancer center sites and non-UPMC cancer centers throughout the region. Disciplines served by this education included physicians, nurses, pharmacists, physician assistants, nurse practitioners, pharmacy technicians, social workers, dietitians, radiation therapists, and dosimetrists.

The results of an educational needs assessment conducted each year are used to design non-core courses. Core oncology classes are held at least three times a year for non-physician health care professionals new to oncology.

Eileen Milakovic, MA, BSN, RN, OCN, program manager, teaches a course in solid tumors to a group of nurses as part of UPMC Cancer Centers' oncology professional education program.



In 2009 there were 132 programs presented, with an attendance of nearly 4,000 professionals, including all of the cancer centers in the network and from non-UPMC centers throughout the region.

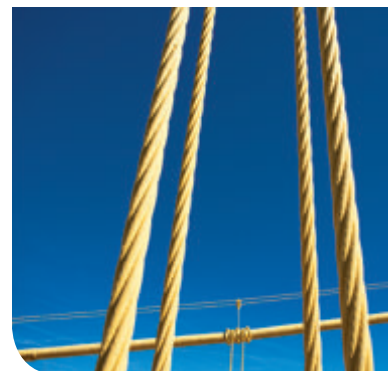
THE CORE CLASSES OFFERED CONSIST OF:

- **Introduction to Oncology for the Health Care Provider** — a general overview of cancer geared to health care professionals and ancillary staff who care for cancer patients in all settings
- **Hematological Malignancies** — an overview of specific hematological malignancies, including staging, treatment options, and nursing care issues
- **Overview of Solid Tumors and the Immune System**
- **Stem Cell Transplant Course**
- **Pathophysiology of Cancer and Cancer Treatment Modalities** — an overview of the principles and roles of various cancer therapies
- **Symptom Management of the Patient with Cancer** — addressing how health care professionals can help patients deal with physical symptoms and issues related to their disease and its treatment
- **Oncology Emergencies and Advanced Cancer Issues**
- **Comprehensive Chemotherapy and Biological Therapies** — a required course for UPMC Cancer Centers professionals who administer and provide care for patients who receive chemotherapy and biotherapy

A review course also is offered several times each year for nurses prior to taking the generalist oncology nursing certification (OCN) exam.

Many other disease-site specific educational programs and seminars are provided throughout the year as new information and issues arise. In addition, one-hour “Lunch & Learn,” “Early Bird,” and dinner learning sessions are held to update staff on a variety of disease processes, symptom management, and other oncology issues. The department also supports UPMC and UPMC Cancer Centers sites in facilitating oncology nursing journal clubs to keep staff apprised of current evidence-based literature, and the radiation oncology sites in providing a monthly learning activity specific to their needs and meeting their continuing education requirements via web- and audio-conferencing formats. Numerous Internet-based learning opportunities also are available through other sources, many of which offer continuing medical education credit. A resource file of these opportunities is maintained by the department for use upon inquiry.

As an NCI-designated Comprehensive Cancer Center, UPCI and its partner in clinical care, UPMC Cancer Centers, are charged with providing oncology education to the region, as well as collaborating with other disciplines and other health care providers in the region when planning and providing this education.



Remembering Jeffrey E. Shogan, MD

"JEFF WAS AN EXTRAORDINARY INDIVIDUAL...AN EQUALLY SKILLED ONCOLOGY PHYSICIAN, BUSINESSMAN, AND HUMANITARIAN. HE HAD AN ABILITY TO SEE AN OPPORTUNITY FOR CHANGE THAT THE REST OF US COULDN'T."



For **Jeffrey E. Shogan, MD**, caring for others came naturally, and it was this caring nature that allowed him to become a well-liked and highly successful medical oncologist. But even as a businessman, his caring nature was evident as he played a leading role in establishing UPMC Cancer Centers in several underserved communities throughout western Pennsylvania and abroad. Dr. Shogan, director of business services and chief business officer of UPMC Cancer Centers, passed away suddenly in January 2010 at age 56.

"Jeff was an extraordinary individual," says Stanley Marks, MD, director of clinical services and chief medical officer, UPMC Cancer Centers. "He was an equally skilled oncology physician, businessman, and humanitarian. He had an ability to see an opportunity for change that the rest of us couldn't. His blend of physician skills, business acumen, and compassion for people was unique. We were fortunate at the Cancer Centers to have benefited from his visionary approach to providing oncology services."

Dr. Shogan was a brilliant medical oncologist who helped to grow the stem cell transplantation program at Allegheny General Hospital before joining UPMC; he also was an integral part of the development and growth of UPMC Cancer Centers. It was his vision and resolve that led to the inception and expansion of one of the largest cancer care networks in the country. His efforts also were fundamental in the international expansion of UPMC Cancer Centers, where he helped to set up two centers in Ireland.

Through the years, Dr. Shogan touched the lives of many people, including his patients. He was admired by colleagues for his remarkable rapport with patients. When his patients learned of his untimely passing, they likened his death to that of losing a friend or family member.

A Pittsburgh native, Dr. Shogan grew up in Monroeville, Pa. After completing his bachelor's degree at Yale University, he served two years in the Peace Corps stationed in Thailand, followed by a year in Nigeria working with Westinghouse, before attending medical school at the University of Pittsburgh. Dr. Shogan's humanitarian efforts extended well beyond his years in the Peace Corps. He established scholarship funds for local students with financial burdens, often purchased text books for nursing and medical students in developing countries, and helped the small country of Bhutan with its health care needs.

During his time in the Peace Corps, he became passionate about the Thai people and their culture. Over the past few years he found time to go back and volunteer, working with children at a Thai orphanage. And most recently, he had begun the process of planning and funding a charitable medical clinic for Thai refugees. "Jeff felt very strongly about bringing better health care to developing countries like Thailand," Dr. Marks says. "To that end, we are working diligently to make that dream a reality. That spoke volumes about him. No matter how tough or politically difficult a challenge was, he was always up to the task. We miss him greatly."

Dr. Shogan will long be remembered for the legacy he left within the local health care community and abroad.



The Circle of Hope

THE CIRCLE OF HOPE HONORS INDIVIDUALS, FAMILY FOUNDATIONS, AND PRIVATELY HELD COMPANIES THAT MAKE CONTRIBUTIONS OF \$10,000 OR MORE IN A CALENDAR YEAR. THIS LIST RECOGNIZES THOSE WHO WERE MEMBERS IN 2009 AND 2010.

The Joseph Allen Foundation
Cheryl and Bruce Americus
Patrice and Robert Americus
Anonymous (8)
Ayers Foundation
Debbie and Michael Barbarita
Rosalie Barsotti and Tony Poli
Beckwith Family Foundation
at the recommendation of
Dotty and Nick Beckwith,
and Alice and Jim* Beckwith
Jack L. Bergstein — *in memory of wife,*
Fyrne Bergstein
Nancy Bernstein and
Robert Schoen, MD
Renard L. Biltgen
Richard M. Boccabella
Mary Ann and Chuck Bogosta
Barbara and Gary Bowser Sr.
Susan and Michael Boyle
Mrs. Lisa Domenico Brooke
Jill Brufsky and Adam Brufsky, MD, PhD
Seth Brufsky
Bernita Buncher
Becky Burgwin and Patrick L. Kane, MD
Barbara and Gerald Chait
Carl Citron
Susan and Alan Citron
Mary and Jay Cleveland Jr.
Sandy and Richard Cohen

Al Copeland Foundation
Caryn and Sam Covelli
J. Samuel and Rose Y. Cox
Foundation
Randall L. Crawford
Barbara and Robert Crown
Sandra N. Danoff
Randi and L. Van V. Dauler, Jr.
Nancy E. Davidson and Thomas Kensler
Jamini Vincent Davies
The Burtis J. Dolan Family
Ann and Edward Dunlap
Mary Lou and Richard Durr
Peter G. Ellis, MD
William F. Fabrizio
Gloria and Michael Fader
Diane M. Faust and
Barry C. Lembersky, MD
Sheila and Milton Fine
Stephanie and Thomas Flannery
Kimberly and Curtis Fleming
Robert Flug
Foster Charitable Foundation
at the recommendation of
Issie and Lee Foster,
Barbara and Bernard Mars,
Wendy Mars, PhD and Peter Mars
Jane France and Chris Allison
Mary Louise Gailliot
Anne Gendler and David Leib

Merle E. and Olive Lee Gilliland
Foundation
David E. Gold and Irene Blumenkranz
Thomas Grealish
Rhonda and Glen Gross
Sara and Alan Guttman
Susan and Barney Guttman
Hawksglen Foundation
Linda* and Grayson G. Heard
Teresa Heinz and The Heinz
Endowments
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University of Pittsburgh Cancer Institute

Cancer

Cancer research has always been ground-breaking science, with discoveries coming in many forms for preventing, detecting, treating, and defeating this disease. At the University of Pittsburgh Cancer Institute (UPCI) and UPMC Cancer Centers, our mission has been to accelerate the translation of our scientific endeavors from the lab to the bedside and back or, in other words, to enable our patients to benefit from our research in the shortest timeframe possible.

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Research

Inhibiting DNA Repair for Cancer Treatment

Opposite: Dr. Ronald Stoller serves as a mentor for junior faculty members, providing guidance in their pursuit of PARP inhibitor-related clinical research.

Our cells are constantly being bombarded by harmful agents like UV radiation or byproducts of metabolism. These agents can damage DNA, the blueprint of cells, leading to cancer-causing mutations. Consequently, the DNA repair process is active constantly as it responds to damage in the DNA structure. When normal repair processes fail, irreparable DNA damage may occur. Some types of cancer chemotherapy and radiotherapy work by overwhelming the capacity of the cell to repair DNA damage, resulting in cell death.

Several University of Pittsburgh Cancer Institute (UPCI) researchers are actively involved in exploring DNA repair pathway inhibition to kill cancer cells. They focus particularly on the poly ADP ribose polymerase (PARP) protein, which is involved mainly in DNA repair, and whose presence in tumors can help predict their response to chemotherapy.

Targeting PARP with ABT-888

The PARP research program at UPCI was started under the leadership of the late **Merrill J. Egorin, MD**, professor of medicine, professor of pharmacology and chemical biology, coleader of the UPCI Molecular Therapeutics and Drug Discovery Program, and codirector of the UPCI Clinical Pharmacology and Analytical Facility. In 2009, Dr. Egorin received the prestigious Translational Research Professorship from the American Society of Clinical Oncology (ASCO). He used funding from the award to continue his preclinical and clinical studies of the PARP family of enzymes and how they work as targets for cancer therapy. Although Dr. Egorin lost his own battle with cancer in August 2010, ASCO has renewed the funding to support his unfinished work.

The PARP family is seen as an extremely promising target for drug development. UPCI already has several PARP inhibitors in early development, including several clinical trials evaluating the drug ABT-888 (veliparib), a PARP inhibitor. Dr. Egorin's award is supporting the expansion of the study of PARP inhibitors in cancer treatments.

Ronald G. Stoller, MD, clinical professor of medicine at the University of Pittsburgh since 1997, trained at NCI after graduating from Harvard Medical School and Peter Brent Brigham Hospital to become a leading medical oncologist with expertise in basic pharmacology. An active member of several clinical research committees, Dr. Stoller is renowned for his expertise in GI and pancreatic cancers. He is the senior clinician in the U01 Phase I program conducted by the late Dr. Merrill Egorin, and is the principal investigator in several Phase I clinical research protocols. His expertise and extensive experience in developing and conducting Phase I trials made him the natural successor to assume the leadership of the Phase I program upon Dr. Egorin's passing. Dr. Stoller also has transitioned into Dr. Egorin's role as mentor for junior faculty members, providing guidance in their pursuit of PARP inhibitor-related clinical research.



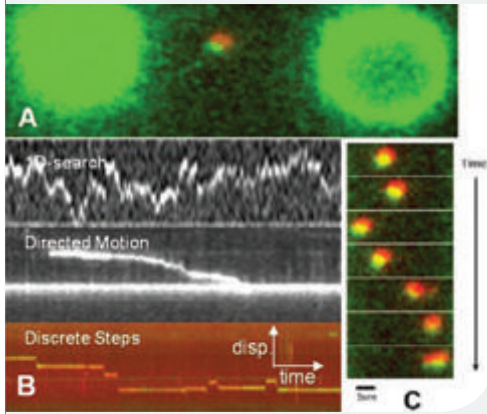
Kristin K. Zorn, MD, assistant professor of obstetrics, gynecology and reproductive science at the University of Pittsburgh, and medical director of the High-Risk Ovarian Cancer Clinic, leads the only study site in western Pennsylvania for a clinical trial of ABT-888 in gynecologic cancers. "Cancer cells have increased levels of PARP, which we believe causes resistance to chemotherapies and other cancer treatments," says Dr. Zorn. "Inhibition of PARP by ABT-888 makes cancer cells more sensitive to chemotherapy and to cell death."

Shannon Puhalla, MD, assistant professor of medicine and a breast oncologist, is studying ABT-888 as a single agent for patients with cancers related to BRCA genetic mutations, which predispose patients to breast and ovarian cancers. "Tumor cells in patients with BRCA mutations are particularly reliant on the mechanism of DNA repair that is mediated by PARP. Therefore, PARP inhibitors are likely to be more effective in treating BRCA-related tumors," says Dr. Puhalla. "Our hope with this trial is that patients with BRCA mutations or certain other breast or ovarian cancers will respond to ABT-888 as a single agent."

This drug is also intriguing because breast cancer patients with BRCA mutations who have exhausted all other therapeutic options may have another treatment to turn to. Other trials also have suggested that ABT-888 may also have fewer side-effects than many other therapies.

Inhibiting DNA Repair for Cancer Treatment

CONTINUED



Above: Watching repair one molecule at a time: Fluorescent images of two DNA repair proteins moving on DNA. **A)** UvrA-green-quantum dot; UvrB-red-quantum dot complex bound to lambda DNA suspended from 5 micron microspheres (large green balls); **B)** Shows one complex moving randomly on DNA over time. **C)** Shows two molecules of UvrAB complex. Molecule 1 binds and then shows motion, in one direction, whereas molecule 2 shows no movement over time, thus the straight line — Kad et. al., 2010 *Molecular Cell* 37(5):702-13.

Opposite: Dr. Ben Van Houten and his team are studying the way two different DNA repair proteins move among DNA molecules.

In previous trials ABT-888 was found to enhance the effect of other cancer drugs, so Dr. Puhalla also has planned a clinical study combining ABT-888 with the cancer drugs carboplatin and paclitaxel for treating advanced solid tumors, supported by a Shapira Foundation grant.

She also received a 2010 Career Development Award from ASCO for her outstanding clinical research. "This award recognizes Dr. Puhalla's tremendous potential, while helping to support her upcoming research — something vitally important to researchers early in their careers," says **Nancy E. Davidson, MD**, director of UPCI and UPMC Cancer Centers.

"Dr. Puhalla has already made a significant impact on our community as the leader of a Phase I clinical trial for patients with BRCA or BRCA-like mutations, and she has an incredibly loyal and passionate patient base."

Dr. Puhalla will also use the award to fund a study investigating the combination of hormone therapy with a drug currently under development that may target breast cancer stem cells. "We want to know whether a drug designed to inhibit the interaction between the cancer cells and conventional hormone therapy could successfully treat certain patients," Dr. Puhalla says. "Ideally, this treatment eventually could allow certain patients to avoid mastectomy or possibly even chemotherapy."

While these translational studies on PARP inhibitors are going on, our scientists are also delving into the mechanism underlying DNA repair.

How Repair Proteins Work

"DNA repair proteins appear to efficiently scan the genome for errors by jumping like a pole vaulter between DNA molecules, or sliding along the strands like a speed skater, and occasionally acting as a detective, perhaps pausing at suspicious spots," says **Ben Van Houten, PhD**, Richard M. Cyert Professor of Molecular Oncology, Department of Pharmacology and Chemical Biology, and leader of the UPCI Molecular and Cellular Cancer Biology Program.

"How this system works is an important unanswered question," he adds. "These DNA repair proteins have to be able to identify very small mistakes in a three-dimensional morass of gene strands in a very rapid timeframe. It's akin to spotting potholes on every street all over the country and getting them fixed before the next rush hour."

Dr. Van Houten's team studied two DNA repair proteins — UvrA and UvrB — and found that the former by itself randomly jumped from one DNA molecule to the next. But a complex of UvrA and UvrB slid along the DNA for as long as 40 seconds before detaching itself and jumping to another molecule. "This is probably one of the coolest experiments my research group has ever done," says Dr. Van Houten. "It was really amazing to be able to observe single molecules of these repair proteins working on the DNA in real time." These molecular insights may help to design other specific DNA repair inhibitors which, like PARP inhibitors, may be used in anti-cancer therapy.



KEY INVESTIGATORS



SHANNON PUHALLA, MD (left)

Assistant professor of medicine and a breast medical oncologist



RONALD STOLLER, MD

Clinical professor of medicine

BENNETT VAN HOUTEN, PhD

Richard M. Cyert Professor of Molecular Oncology, Department of Pharmacology and Chemical Biology, and leader of the UPCI Molecular and Cellular Cancer Biology Program

KRISTIN K. ZORN, MD (right)

Assistant professor of obstetrics, gynecology and reproductive science at the University of Pittsburgh, and medical director of the High-Risk Ovarian Cancer Clinic

Autophagy and Cancer: Targeting Cancer Cell Survival Pathways

Opposite: Dr. Michael Lotze and his team are focused on understanding the underlying mechanisms of autophagy and how this process might be manipulated in order to more effectively treat cancer patients.

Our cells are dynamic, continually reacting and responding to environmental cues and stressors. How a cell adapts to the many signals it receives determines its fate and how it lives in the environment. Disruption or overactivity of certain cellular pathways can promote cancer development and progression by signaling that a cell should grow and divide when it shouldn't, or enabling a cell to refuse to die when it should.

Autophagy and Cancer

Derived from the Greek words “auto” meaning “self” and “phagy” meaning “to eat,” autophagy is the normal process by which a cell can break down and recycle its own components. Autophagy is critical for normal cell growth and functioning, and provides a balance between the generation of new cellular products and the degradation and recycling of old cellular parts. Autophagy also enables a cell to redirect energy and nutrients during periods of starvation or extreme stress, in order to meet its most essential needs.

Autophagy plays a dual role in cancer. It prevents normal cells from accumulating damaged parts and genetic alterations, thereby protecting them from becoming cancer cells. On the other hand, autophagy supports the survival of cancer cells by enabling them to thrive under strenuous conditions of starvation, stress, and isolation during metastasis.

Michael T. Lotze, MD, wears several hats at the University of Pittsburgh Cancer Institute (UPCI) and the University of Pittsburgh. He is professor of surgery and bioengineering; vice chair of research, Department of Surgery; assistant vice chancellor for sponsored training grants, School of Health Sciences; and leader of the catalyst program at the Clinical and Translational Research Institute. His most recent work is focused on understanding the underlying mechanisms of autophagy and how this process might be manipulated in order to more effectively treat cancer patients.

Dr. Lotze and colleagues, including UPCI researchers **Daolin Tang, MD, PhD**, and **Herbert J. Zeh, MD, PhD**, assistant professor of surgery, recently discovered that the cellular protein high mobility group box 1 (HMGB1) is a critical regulator of autophagy, a finding that was published in the *Journal of Cell Biology*.¹ While HMGB1 normally is found in the cell nucleus, under conditions of prolonged cellular stress, it travels to the cytoplasm where it interacts with other proteins to promote cell survival through autophagy. “Resistance of cancer to chemotherapy, radiation therapy, and immunotherapy is likely due to autophagy,” says Dr. Lotze. “It is a form of ‘programmed cell survival’ that allows cancer cells to persist.”

In a related study published in the journal *Oncogene*,² Dr. Lotze’s team reported that HMGB1 promotes cancer cell survival after chemotherapy. When HMGB1 activity was blocked in cancer cells, the cells became significantly more sensitive to chemotherapy, causing them to die.

These exciting findings in the field support the use of HMGB1 inhibitors in combination with conventional anti-cancer therapies as a way to enhance treatment effectiveness. Dr. Lotze has teamed up with Dr. Zeh and UPCI clinicians **Leonard Appleman, MD, PhD**, assistant professor of medicine, and **Jodi Maranchie, MD, FACS**, assistant professor of urology, to launch two studies testing the anti-autophagic agent hydroxychloroquine in patients with renal cell or pancreatic carcinomas. In addition, Dr. Lotze’s team is initiating a nationwide clinical trial



through the Cytokine Working Group to test hydroxychloroquine in combination with the immune stimulant interleukin-2 in patients with metastatic kidney cancer.

“We are hopeful that by blocking the autophagic cell survival process in cancer cells, we can create a better outcome for patients,” says Dr. Lotze.

- 1 Tang D, Kang R, Livesey KM, Cheh CW, Farkas A, Loughran P, Hoppe G, Bianchi ME, Tracey KJ, Zeh HJ 3rd, Lotze MT. Endogenous HMGB1 regulates autophagy. *J Cell Biol.* 2010 Sep 6;190(5):881-92.
- 2 Tang D, Kang R, Cheh CW, Livesey KM, Liang X, Schapiro NE, Benschop R, Sparvero LJ, Amoscato AA, Tracey KJ, Zeh HJ, Lotze MT. HMGB1 release and redox regulates autophagy and apoptosis in cancer cells. *Oncogene.* 2010 Sep 23;29(38):5299-310.

KEY INVESTIGATORS

LEONARD APPLEMAN, MD, PhD

Assistant professor of medicine

MICHAEL T. LOTZE, MD

Professor of surgery and bioengineering; vice chair of research, Department of Surgery; assistant vice chancellor for sponsored training grants, School of Health Sciences; and leader of the catalyst program at the Clinical and Translational Research Institute

JODI MARANCHIE, MD, FACS

Assistant professor of urology

HERBERT J. ZEH, MD, PhD

Assistant professor of surgery

Targeted Cancer Treatment

Opposite, left: Drs. Jennifer Grandis and Robert Ferris, both practicing otolaryngologists, are studying the efficacy of EGFR inhibitors and the role the immune system plays in stimulating patient response.

Right: Shi-Yuan Cheng, PhD, and Frank Lieberman, MD, and their team found that ZD6474, an EGFR and VEGFR inhibitor, significantly suppressed tumor growth and angiogenesis, and promoted tumor cell death, in certain brain tumors, including malignant glioma, the most common and most aggressive type of brain cancer.

Treatments for cancer have traditionally focused on chemotherapy agents that damage DNA, which results in cell death; however, they are associated with toxic side effects, often limiting their use and causing patients great discomfort. Over the past five years, we have seen the emergence of targeted therapies in oncology. These new cancer treatments can inhibit interactions occurring on the cell surface or inside cancer cells, resulting in the blockage of essential biologic pathways and ultimately causing cell death. A major class of targeted agents is the epidermal growth factor receptor (EGFR) inhibitors. High levels of EGFR were found in various human cancers, and patients who have high EGFR expression have poor disease prognosis.

EGFR Blocking Strategies

Strategies to block EGFR function include inhibiting EGFR expression, activation, and signaling.

The four general classes of EGFR inhibitors are:

- EGF-toxin conjugates
- monoclonal antibodies
- tyrosine kinase-specific inhibitors
- antisense approaches

Several monoclonal antibodies (cetuximab and panitumumab) and tyrosine kinase-specific inhibitors (gefitinib, erlotinib, and lapatinib) have been approved to treat cancers, either alone or in combination with other chemotherapeutics or radiation.

Targeting EGFR in Head and Neck and Brain Cancers

As a physician-scientist, **Jennifer R. Grandis, MD, FACS**, professor of otolaryngology and leader of the University of Pittsburgh Cancer Institute (UPCI) Head and Neck Cancer Program, sees the effects of head and neck cancer and its treatments firsthand. “The current standard of care delivers far too much toxicity and morbidity to patients,” she says. Antisense strategies (a method of blocking the expression of certain genes) using DNA or RNA oligonucleotides have been designed to inhibit oncogenes or growth factors and their receptors. Dr. Grandis and colleagues found that EGFR antisense gene therapy in head and neck cancer patients are not toxic and may be effective. “For 10 years, it felt like we were walking on this path — now we’re putting the rollerblades on,” she says. Like EGFR, the estrogen receptor (ER) plays a significant role in lung cancer growth.

Jill Siegfried, PhD, professor of pharmacology and chemical biology and coleader of the UPCI Lung and Thoracic Malignancies Program, and colleagues were among the first to demonstrate the functional significance of estrogen receptors in lung tumors. They found that a combination therapy of the EGFR inhibitor gefitinib and the estrogen receptor inhibitor fulvestrant inhibited the tumors and was nontoxic for treating patients with lung cancer.

Clinical trials with other drug combinations are currently in progress. “The same drugs which are highly effective in controlling ER-positive breast cancer while being relatively nontoxic may show high efficacy in lung cancer,” says Dr. Siegfried. “Who knew? We followed clues suggesting that lung tumors were hormone-responsive cancers to provide evidence supporting this possibility.”

Malignant glioma is the most common brain tumor and typically has a very poor prognosis. The failure of current therapies is due to its high proliferation, extremely invasive behavior,



and robust blood vessel formation. **Shi-Yuan Cheng, PhD**, and **Frank Lieberman, MD**, and their colleagues of the UPCI Brain Tumor Program found that ZD6474, an inhibitor of EGFR and VEGFR (a receptor involved in blood vessel growth), significantly inhibited tumor growth, angiogenesis, and promoted tumor cell death of specific brain tumors, which express a variant form of EGFR.

Possible Role of Immune System in EGFR Inhibitor Action

Not all head and neck cancer patients respond to cetuximab, an EGFR blocking antibody, and clinical responses are not correlated with the level of EGFR expression on tumor cells.

Robert L. Ferris, MD, PhD, professor of otolaryngology and coleader of the UPCI Cancer Immunology Program, thinks that the use of antibodies raises the potential that the immune system might play a role in this clinical activity. "Anti-tumor effects in patients may be due in part to immune cell activation. The immune system activation may explain why some patients respond clinically to these antibodies while others do not," says Dr. Ferris.

KEY INVESTIGATORS



SHI-YUAN CHENG, PhD

Associate professor of pathology

ROBERT L. FERRIS, MD, PhD, FACS

Professor of otolaryngology and coleader of the UPCI Cancer Immunology Program

JENNIFER R. GRANDIS, MD, FACS

Professor of otolaryngology and coleader of the UPCI Head and Neck Cancer Program

FRANK LIEBERMAN, MD

Associate professor of neurology and medical oncology and director, Adult Neuro-oncology Program, UPMC Cancer Centers

JILL SIEGFRIED, PhD (left)

Professor of pharmacology and chemical biology and coleader of the UPCI Lung and Thoracic Malignancies Program

UPCI Researchers Unlock New Secret to Lung Cancer Growth



Dr. Steven Shapiro and his team have studied the role of neutrophils in lung cancer growth.

More than 150,000 people die of lung cancer each year in the United States. The University of Pittsburgh Cancer Institute (UPCI) has an exceptional Lung and Thoracic Malignancies Program, which is recognized and partially supported by a Specialized Program of Research Excellence (SPORE) grant from the National Cancer Institute.

Steven D. Shapiro, MD, Jack D. Myers professor and chair of the Department of Medicine at the University of Pittsburgh, UPMC's chief medical and scientific officer, and member of UPCI's Lung and Thoracic Malignancies Program, is a renowned pulmonologist and researcher who has dedicated his career to understanding and treating lung disease. His pioneering research efforts have led to a greater understanding of the role of inflammatory cells in the progression of chronic obstructive pulmonary disease (COPD), emphysema, and lung cancer.

The latest findings from his research lab have shed light on the role of neutrophils, the most abundant type of white blood cell and an essential part of the body's immune system, in lung cancer growth. Dr. Shapiro and **McGarry Houghton, MD**, assistant professor of medicine at the University of Pittsburgh and member of UPCI's Lung and Thoracic Malignancies Program, used a mouse model of lung tumor formation. They were the first to demonstrate that activation of a common lung oncogene, K-ras, was associated with a robust inflammation that brought neutrophils to the tumor site. "The neutrophils are actually being recruited by the tumor itself," says Dr. Houghton, who is a recipient of the 2010 Kimmel Scholar Award for his research on IRS1-mediated regulation of P13K and MEK/ERK activity in lung cancer. "The chemokines — the signals that tell the neutrophils to go to this place — are being released by the tumor." Correlating these studies with human disease, the research team found that human lung cancers that harbor activating K-ras mutations have a higher degree of inflammation.

Until recently, it was still unclear what role these inflammatory cells were playing in the tumor micro-environment. In an exciting new study published in *Nature Medicine*¹ and led by Dr. Houghton, a novel cancer-promoting role of an enzyme released by neutrophils, called neutrophil elastase, was discovered. The Shapiro-Houghton team showed that mice that did not contain the neutrophil elastase gene developed strikingly fewer tumors and survived, in contrast to mice that have the gene. Furthermore, neutrophil elastase directly caused both human and mouse lung cancer cells to grow.

The Shapiro-Houghton team has begun to explore the use of neutrophil elastase inhibitors in mice, and found that administration of one inhibitor reduced lung cancer growth by 69%. These findings support the initiation of clinical trials to determine if this novel treatment approach might provide similar benefit in lung cancer patients. "I have spent my career trying to understand and treat COPD, and we have ended up with agents to fight lung cancer and infections," says Dr. Shapiro. "Science is an interesting ride — you never know where it will take you. But we couldn't be more pleased with our opportunities to help patients with lung cancer."

¹ Houghton AM, Rzymkiewicz DM, Ji H, Gregory AD, Egea EE, Metz HE, Stolz DB, Land SR, Marconcini LA, Kliment CR, Jenkins KM, Beaulieu KA, Mouded M, Frank SJ, Wong KK, Shapiro SD. Neutrophil elastase-mediated degradation of IRS-1 accelerates lung tumor growth. *Nat Med*. 2010 Feb;16(2):219-23.

KEY INVESTIGATORS



MCGARRY HOUGHTON, MD (left)

Assistant professor of medicine at the University of Pittsburgh and member of UPCI's Lung and Thoracic Malignancies Program

STEVEN D. SHAPIRO, MD

Jack D. Myers professor and chair of the Department of Medicine at the University of Pittsburgh, UPMC's chief medical and scientific officer, and member of UPCI's Lung and Thoracic Malignancies Program

Protection from Harmful Radiation



Growing terrorist threats have highlighted gaps in research and development of medical countermeasures for protecting the U.S. civilian population against radiation. Few products are currently available for prevention of radiation injury, for treatment of post-exposure injury, or for the rapid identification of exposed individuals requiring treatment. The National Institutes of Health (NIH) has created the Center for Medical Countermeasures against Radiation (CMCR) program to increase collaborative efforts between academic institutions working to develop new medical technology for defense of the public. The University of Pittsburgh Cancer Institute (UPCI), under the leadership of **Joel S. Greenberger, MD**, chairman of the Department of Radiation Oncology and coleader of the UPCI Lung and Thoracic Malignancies Program, is part of the CMCR program.

In 2005, Dr. Greenberger and his team received funding of \$10 million over a period of five years from the NIH to study mitochondria, the energy generators of cells. They examined several inhibitors of radiation damage. In collaboration with **Peter Wipf, PhD**, of the University of Pittsburgh Chemistry Department and UPCI Molecular Therapeutics and Drug Discovery Program, Dr. Greenberger's team developed JP4-039, a drug that assists mitochondria in mitigating radiation-induced damage. The NIH grant was renewed this year for \$13.9 million to continue this research.

"With our previous funding, we dedicated our time to exploring the mitochondria and developing drugs that could counteract damage caused by radiation exposure," says Dr. Greenberger. "We proved that targeting small molecules to the mitochondria was a successful approach. With our current funding, we hope to accomplish a variety of goals, including identifying genes for targeted therapies, finding a new approach to the development

of radiation mitigators, and developing strategies to deliver the drugs quickly and intelligently to block mitochondria 'wrong-doings' that could lead to massive cell death after a nuclear event."

In addition, Dr. Greenberger's laboratory found that resveratrol, the natural antioxidant commonly found in red wine and many plants, protects cells in preclinical models from radiation. "Our work is truly a multidisciplinary effort in which the combined expertise and knowledge of biochemists, clinical researchers, chemists, pharmacologists, and pharmacists led to the successful development of novel protectors and mitigators against irradiation damage," says Dr. Greenberger.

A variety of acute and chronic diseases are caused by oxidative damage mediated by reactive oxygen species (ROS). Mitochondria are the main source of ROS within most cells, so there is increasing interest in the development of ROS scavengers, which are specifically targeted to and concentrated within mitochondria. One of these scavengers, XJB-5-131, has been shown to improve intestinal mucosal injury and prolong survival in rats subjected to lethal hemorrhage.

Dr. Greenberger's group has demonstrated that the expression of the human manganese superoxide dismutase (MnSOD) protein confers protection of normal tissues from ionizing irradiation damage. They used lipid spheres containing DNA, which can express the MnSOD protein to treat lung cancer patients with concurrent chemotherapy (paclitaxel and carboplatin) to simultaneously kill the cancer cells and protect the normal lung cells from radiation damage. This treatment was found to protect lung cancer patients from radiation toxicity. Similar concurrent treatment also was effective in experimental esophagus and head and neck cancers.

KEY INVESTIGATORS



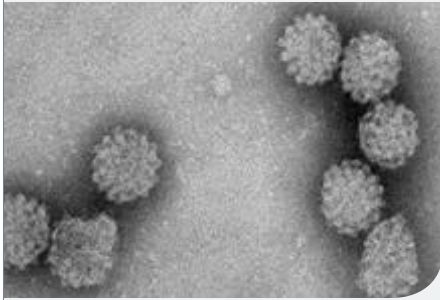
JOEL S. GREENBERGER, MD (left)

Chairman of the Department of Radiation Oncology and coleader of the UPCI Lung and Thoracic Malignancies Program

PETER WIPF, PhD

University professor of chemistry, University of Pittsburgh and UPCI Molecular Therapeutics and Drug Discovery Program

Cancer Virology



Above: Merkel cell virus

Opposite: The husband-and-wife team of Drs. Patrick Moore and Yuan Chang followed their 2003 discovery of the virus that causes Kaposi's sarcoma with the 2008 discovery of the virus that causes Merkel cell carcinoma, a rare skin cancer.

Viruses and Cancer

Infections with certain viruses, bacteria, and parasites have been recognized as a risk factor for several types of human cancer. Worldwide, infection is linked to about 15 percent to 20 percent of cancers. In the United States and other developed countries, fewer than 10 percent of all cancers are thought to be linked to infectious agents; in developing countries, however, infections can be the cause of the majority of all cancers. Of the many viruses that infect humans, only seven (hepatitis B virus, hepatitis C virus, human T-lymphotropic virus, human papilloma virus, Epstein-Barr virus, Kaposi's sarcoma herpes virus, and Merkel cell polyomavirus) have so far been shown to cause cancer.

Discovery of Two Cancer-causing Viruses

Two of these cancer-causing viruses — Kaposi's sarcoma herpes virus (KSHV) and Merkel cell polyomavirus (MCV) — were discovered by a husband-and-wife team of virologists at the University of Pittsburgh Cancer Institute (UPCI), **Yuan Chang, MD**, professor of pathology, and **Patrick Moore, MD, MPH**, professor of microbiology and molecular genetics and leader of the UPCI Cancer Virology Program. Drs. Chang and Moore teamed up to establish that KSHV causes Kaposi's sarcoma (KS), the leading cause of cancer in patients with HIV/AIDS. For this discovery, they shared the prestigious Robert Koch Prize in 1998 and Charles S. Mott Prize in 2003.

Boosted by this success, they turned attention to a form of rare skin cancer called Merkel cell carcinoma (MCC). Like KS, this cancer occurs more frequently in individuals who have a weakened immune system, such as those who have received organ transplants or have HIV/AIDS. Using new methods they had developed over a decade, the Chang-Moore team reported their discovery of MCV from MCC in January 2008.

For these phenomenal discoveries, Drs. Chang and Moore were selected as the highly prestigious Research Professors of the American Cancer Society (2009-2013).

MCV Causes MCC

Although there was strong initial evidence that MCV caused MCC, Drs. Chang and Moore cautioned that additional proof was needed. Subsequent studies from laboratories around the world confirmed their findings. "MCV infects normal cells before they turn into cancer cells," says Dr. Moore, who also is director of UPCI's Cancer Virology Program. It seems that MCV is harmless in a healthy cell until the virus mutates and causes the cell to multiply abnormally, creating a cancerous tumor. "It looks very much like MCV is the culprit that causes the disease," he adds.

With the help of other UPCI laboratories, the Chang-Moore team developed assays to rapidly detect the virus in human serum and tissue. It turns out that most of us are exposed to MCV early in life. Evidence of MCV infection is seen in 50 percent of children by age 15 and more than 80 percent of adults over 50 years. But cancer rarely follows unless viral DNA becomes mutated, possibly by skin exposure to sun. These rare mutations explain why a common, harmless infection can turn into an uncommon cancerous condition. Although past MCV exposure is common among all adult groups, MCC patients have markedly elevated



MCV antibodies present in their serum. The Chang-Moore team's most recent study shows that viral oncogenes drive the proliferation of the cancer cells and, if the viral genes are blocked, the MCC cells die.

Future Treatment

There is no current treatment for MCV infection and conventional cancer therapies are only marginally effective for MCC. Identifying specific cellular pathways targeted by MCV can lead directly to new, more effective and less toxic therapies for this human cancer. Some questions about the biology of MCV still remain unanswered.

Can MCV cause other cancers? So far there is no evidence. But UPCI scientists are already screening drug libraries to find better therapies that block the virus and its cancer-causing pathways. With the combined laboratory and clinical research facilities at UPCI, they hope to soon start clinical trials to test effective therapies for this deadly skin cancer.

KEY INVESTIGATORS

YUAN CHANG, MD

Professor of pathology

PATRICK MOORE, MD, MPH

Professor of microbiology and molecular genetics and leader of the UPCI Cancer Virology Program

Therapeutic and Preventive Potential of Cancer Vaccines

Nearly all cancer patients are treated with either surgery, radiation, chemotherapy, or a combination of one or more of these three options. For decades, oncologists have been exploring other treatments that more specifically target cancer cells while leaving normal cells unharmed. This approach could decrease toxicity to patients and increase the potential elimination of residual cancer cells throughout the body and may, in turn, prevent cancers from recurring.

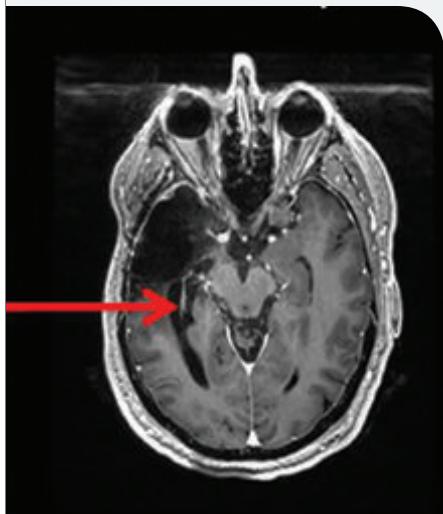
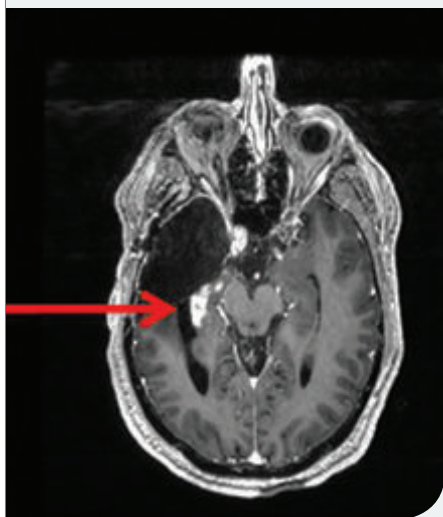
Immunotherapy attempts to stimulate the body's natural immune defense systems to either prevent cancer from forming in the first place, or to combat cancers that already have developed in patients. Both therapeutic and preventive "cancer vaccines" have been and are currently being explored at the University of Pittsburgh Cancer Institute (UPCI) for a number of different cancer types including pancreatic, ovarian, colon, breast, brain, prostate, and skin cancers.

Therapeutic Cancer Vaccines

Olivera J. Finn, PhD, is a distinguished professor and chair of the Department of Immunology at the University of Pittsburgh School of Medicine, and coleader of the Cancer Immunology Program at UPCI. She also is an international leader and pioneer in the field of cancer vaccines.

In 1989, Dr. Finn's group identified a novel immune response to the tumor-associated protein MUC1, which is found at high levels on some of the most common cancers, including breast, colon, lung, prostate, and pancreas. She and her collaborators have since developed and tested several types of MUC1 vaccines in animal models and, subsequently, in clinical trials. All the vaccines were well-tolerated and effective: In the last completed and published trial of 12 vaccinated pancreatic cancer patients, there were five long-term survivors, a much higher number than expected. Studies are underway to fully elucidate the immune effects that correlate with this impressive clinical response, so that it can be replicated in future trials. Dr. Finn's group continues to study ways to make cancer vaccines more effective in stimulating an anti-cancer immune response.

Brain cancers are another target for cancer vaccines. **Hideho Okada, MD, PhD**, associate professor of neurological surgery at the University of Pittsburgh School of Medicine, and coleader of the UPCI Brain Tumor Program, is leading a clinical trial to test the first-ever cancer vaccine developed for low-grade gliomas, a slow-growing type of brain cancer with extremely high risks for transforming into more aggressive high-grade gliomas. Dr. Okada hopes that early intervention with a novel cancer vaccine that targets specific brain tumor proteins, given in combination with an immune system booster, could slow, stop, or even reverse the growth of glioma cells in patients. "We believe that the effect of immunotherapy could be long-lasting," Dr. Okada says, "and the slow-growing nature of these gliomas gives us sufficient time to vaccinate and revaccinate patients." Initial results from a clinical trial, conducted with fellow UPCI investigators **Pawel Kalinski, MD, PhD**; **Arlan Mintz, MD, MSc**; **David Bartlett, MD**; **Herbert J. Zeh, MD, PhD**; **Theresa L. Whiteside, PhD**; **Lisa Butterfield, PhD**; **Ian Pollack, MD**; and **Frank Lieberman, MD**, show that the vaccine is safe and stimulated immune function in patients with aggressive high-grade gliomas. As reported in the *Journal of Clinical Oncology*,¹ of the 22 patients who received the therapy, nine had no tumor progression for at least one year following treatment, and one patient had a sustained complete disappearance of tumors



Magnetic Resonance Image (MRI) of patient whose brain tumor disappeared completely following treatment with Dr. Okada's cancer vaccine. In the top MRI, the red arrow points to the white tumor mass before treatment. The tumor is no longer visible in the bottom MRI, taken 33 weeks after treatment.

(shown in MRIs at left). These promising early results are a powerful driver for a large study with glioma patients.

Dr. Okada's group also uses preclinical models to examine the biological mechanisms of how their cancer vaccines work to combat brain tumors. They recently discovered that the effectiveness of the anti-glioma vaccine with immune booster depends on proper functioning of proteins called interferons. Clarifying the specific protein signaling pathways involved in immune stimulation could enable them to develop more robust cancer vaccine combinations.

Preventive Cancer Vaccines

While ground-breaking trials explore the benefits of immunotherapy to treat cancers, Dr. Finn believes that cancer vaccines have the potential to work best as a preventive measure in those who are at high risk for — but have not yet developed — cancer. For support, she cites her study published recently in *Cancer Prevention Research*² on a genetically engineered strain of mice developed with a predisposition to inflammatory bowel disease (IBD), a known risk factor for colorectal cancer. While 80 percent of untreated mice went on to develop cancer, the MUC1 vaccine-treated mice were far less likely to develop IBD, and almost none developed cancer.

Together with **Robert Schoen, MD, MPH**, professor of medicine and epidemiology at the University of Pittsburgh, Dr. Finn's group now is testing the MUC1 vaccine in people who are at high risk of colon cancer because they have had advanced colon polyps removed. The researchers hope that administration of the vaccine will prevent polyp recurrence, thereby removing the potential for colon cancer development. "If we immunize early on, the cells that become abnormal might actually be eliminated by a strong immune response," says Dr. Finn. Because tumors can release factors that suppress a patient's immune system, and because modern first-line cancer treatments such as chemotherapy may also decrease immune function, a patient's chance of developing a strong immune response to cancer proteins is much greater if the vaccine is given at an early stage or in the prophylaxis.

1 Okada H, Kalinski P, Ueda R, Hoji A, Kohanbash G, Donegan TE, Mintz AH, Engh JA, Bartlett DL, Brown CK, Zeh H, Holtzman MP, Reinhart TA, Whiteside TL, Butterfield LH, Hamilton RL, Potter DM, Pollack IF, Salazar AM, Lieberman FS. Induction of CD8+ T-cell responses against novel glioma-associated antigen peptides and clinical activity by vaccinations with D-type-1-polarized dendritic cells and poly-ICLC in patients with recurrent malignant glioma. *J Clin Oncol*. 2010 Dec 13.

2 Beatty PL, Narayanan S, Gariépy J, Ranganathan S, Finn OJ. Vaccine against MUC1 antigen expressed in inflammatory bowel disease and cancer lessens colonic inflammation and prevents progression to colitis-associated colon cancer. *Cancer Prev Res (Phila)*. 2010 Apr;3(4):438-46.

KEY INVESTIGATORS



OLIVERA J. FINN, PhD

Distinguished professor and chair of immunology at the University of Pittsburgh School of Medicine, and coleader of the Cancer Immunology Program at UPCI



HIDEHO OKADA, MD, PhD

Associate professor of neurological surgery at the University of Pittsburgh School of Medicine, and coleader of the UPCI Brain Tumor Program

Cancer Epidemiology, Prevention, and Control

Opposite: Dr. Robert Schoen and his team's study of surveillance colonoscopy rates showed that the procedure is over-used among patients at low risk for developing colon cancer, but that patients with a history of polyps are not receiving follow-up colonoscopies as early or as often as they should in relation to their risk of recurrence.

Hormone Treatment Effects on Breast Cancer

The use of hormone replacement therapy (HRT) in the United States decreased substantially following reports in 2002 of adverse effects of estrogen plus progestin. Subsequently, the incidence of breast cancer also dropped, suggesting a cause-and-effect relation between HRT and breast cancer, although the exact cause of this decrease remains controversial. **Lewis Kuller, MD, DrPH**, professor of epidemiology at the University of Pittsburgh Graduate School of Public Health and a member of the University of Pittsburgh Cancer Institute (UPCI) Cancer Epidemiology, Prevention, and Control Program, in collaboration with Women's Health Initiative (WHI) investigators, recently reported that the increased risk of breast cancer associated with estrogen-plus-progestin therapy in the WHI patients declined markedly soon after discontinuation of the therapy.¹ This finding supports the hypothesis that the recent reduction in the incidence of breast cancer among women in certain age groups in the United States is partially related to a decrease in the use of combined estrogen plus progestin.

Genetic Basis of Tobacco Addiction

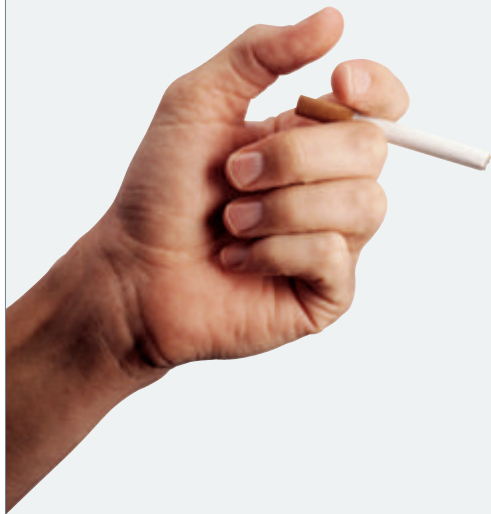
Smoking cessation strategies continue to have disappointing results. Does genetic difference influence smoking behaviors? If so, we may be able to develop tailored strategies that increase the likelihood of successful cessation. **Marjorie Romkes, PhD; Stephanie Land, PhD; Kenneth Perkins, PhD; and Joel Weissfeld, MD, MPH**, of the UPCI Cancer Epidemiology, Prevention, and Control Program study the genetic basis for tobacco addiction, the major lung cancer risk factor. Dopamine is a neurotransmitter — a chemical messenger that transmits signals from a nerve cell — associated with smoking addiction. In the Pittsburgh Lung Screening Study (PLuSS), this physician team found that people with one copy of a particular variant of the dopamine receptor gene DRD2 were less likely to quit smoking than people with two copies of the gene. This finding reveals that both addiction to cigarettes and the inability to quit smoking are influenced by genetics.

Prostate Cancer Screening

The use of prostate-specific antigen (PSA) testing as a screening tool for prostate cancer has increased dramatically in the United States since 1988, but is this screening really beneficial? Dr. Joel Weissfeld, professor of epidemiology and the leader of the UPCI Cancer Epidemiology, Prevention, and Control Program, and colleagues from national Prostate, Lung, Colorectal, and Ovarian Cancer Screening Trial recently compared prostate cancer mortality of patients who were screened by PSA testing and digital rectal examination to patients who were not screened. The rate of death from prostate cancer was very low and did not differ significantly between the two study groups. Risks incurred by screening, diagnosis, and resulting treatment of prostate cancer can be significant.² These results support the validity of the recent recommendations by the U.S. Preventive Services Task Force against prostate cancer screening, especially against screening all men over the age of 75 years.

Colonoscopy and Colorectal Cancer

Two recent papers published by UPCI researchers indicate that surveillance colonoscopy may need to be better aligned with a patient's risk for colorectal cancer. The studies provide





evidence that colonoscopy is both overused and underused in particular patient populations with serious implications for health care spending.

Robert E. Schoen, MD, MPH, professor of medicine and epidemiology at the University of Pittsburgh, and a member of the UPCI Cancer Epidemiology, Prevention, and Control Program, and his collaborators assessed the rates of surveillance colonoscopy performed to monitor patients who were found to have adenomas — precancerous polyps — on a previous colonoscopy. The aim of surveillance colonoscopy was to identify and remove recurrent growths before they had advanced to cancer.

“Guidelines recommend that patients with a history of precancerous lesions, especially advanced precancerous lesions, have follow-up colonoscopies earlier and more often than patients who do not have polyps,” said Dr. Schoen. “Yet our studies show surveillance colonoscopy is not being used by the medical system in relation to underlying risk. High-risk patients aren’t receiving timely follow-up colonoscopies, yet colonoscopy is over-utilized among low-risk patients who are unlikely to develop colon cancer. This misuse wastes health care resources and risks development of cancers that might have been preventable in high-risk patients.

“Despite regular colonoscopy, colorectal cancer may still occur,” said Dr. Schoen. “We found that patients with a history of advanced polyps are at particular risk and should be monitored closely with timely surveillance examinations. Our studies indicate how surveillance colonoscopy is being implemented, and represent a call to action to align colonoscopy use more closely with patient risk, especially in this era of spending health care dollars most effectively.”

In recognition of his work on colon cancer, Dr. Schoen was awarded the 2010 Sadie Gerson Distinguished Scholar Award.

Cancer Epidemiology, Prevention, and Control

CONTINUED

Opposite: Drs. Shivendra Singh (left) and Jan Beumer are studying the cancer chemopreventive properties of vegetables such as garlic and broccoli.



Cancer Prevention and Treatment by Diet and Natural Products

Population-based, case-control studies suggest an inverse association between intake of many edible plants and cancer risk. **Shivendra Singh, PhD**, professor of pharmacology and chemical biology, associate director of UPCI basic research, and member of the UPCI Cancer Epidemiology, Prevention, and Control Program, and his colleagues are investigating cancer chemoprevention by bioactive constituents of edible vegetables, including garlic and broccoli, using preclinical models.

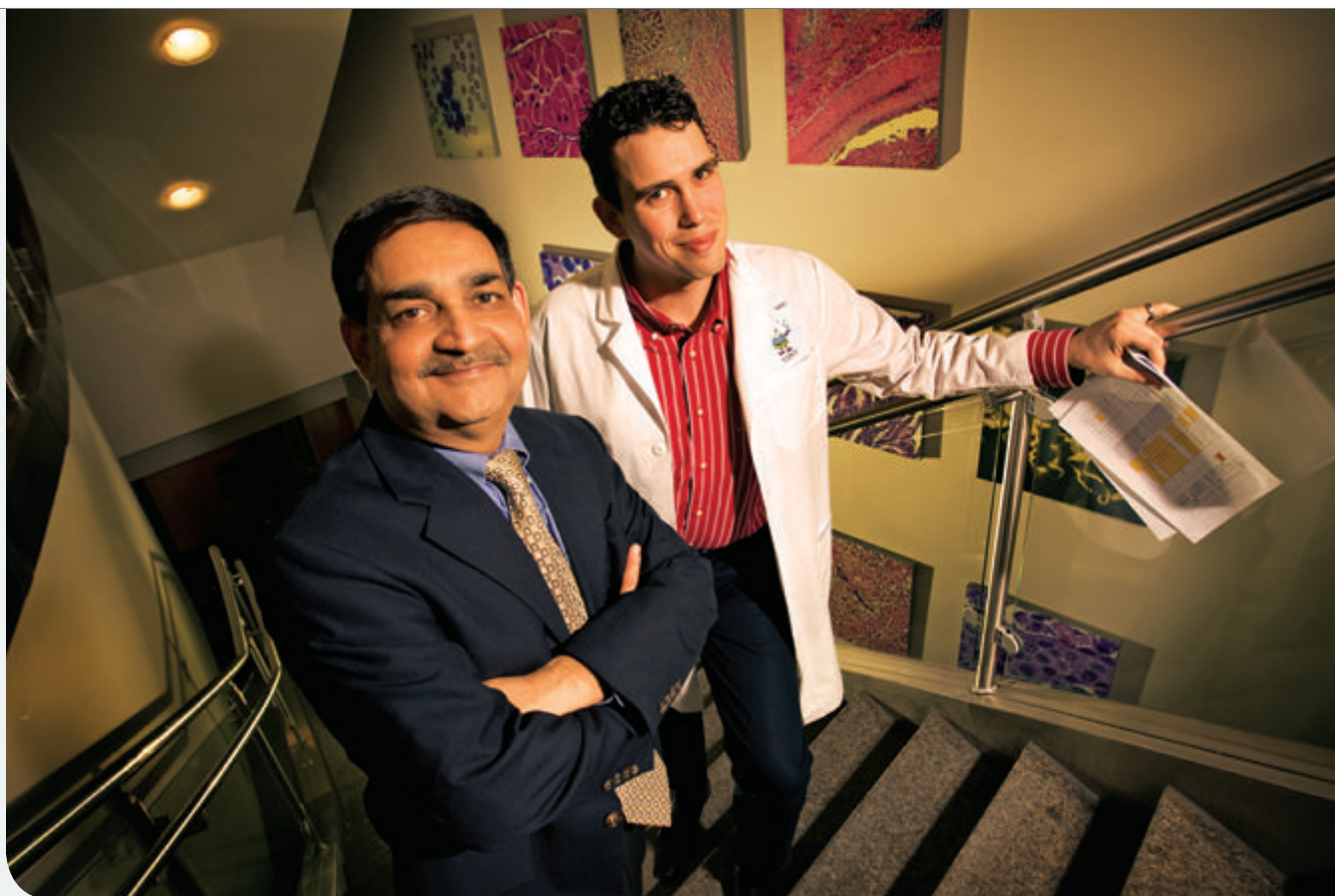
Research from this group, which includes **Jan Beumer, PharmD, PhD**, assistant professor of pharmaceutical sciences and director of the UPCI Clinical Pharmacology Analytical Facility, thus far has demonstrated that many of these compounds, including garlic-derived DATS (diallyl trisulfide), broccoli-constituent SFN (sulforaphane), and watercress-derived PEITC (phenethyl isothiocyanate), selectively kill cancer cells in culture, and inhibit human cancer cell growth and spontaneous cancer development in transgenic animal models without any toxicity. This background work lays the foundation for future clinical studies of the safety and biological effects of these agents in humans.

Jennifer R. Grandis, MD, FACS, American Cancer Society clinical professor, professor of otolaryngology and leader of the UPCI Head and Neck Cancer Program, Dr. Singh, and colleagues have found that guggulsterone, from mukul of the plant *Commiphora mukul* that is used in Indian ayurvedic medicine, kills head and neck cancer cells, decreases their spreading, and enhances the effects of currently available chemotherapies. Dr. Singh's group also has shown that withaferin A, the active component of ashwagandha, a plant that has been used safely for centuries in the Indian ayurvedic medicine practice, inhibits growth of human breast cancer cells.

These studies at UPCI have been recently strengthened by the recruitment of **Thomas Kensler, PhD**, professor of pharmacology and chemical biology, and member of the UPCI Cancer Epidemiology, Prevention, and Control Program. Dr. Kensler, an expert on chemoprevention of cancer by dietary components, has a long history of conducting clinical studies on the chemoprevention of liver cancer in China, where people are known to consume aflatoxin-contaminated foods. Chinese people also are exposed to high levels of the airborne toxin phenanthrene. Dr. Kensler's group found that drinking hot water infusions of three-day-old broccoli sprouts could protect against food-borne and airborne toxicants.

Emphysema May Lead to Lung Cancer

Is there an association between emphysema and lung cancer? **Joel Weissfeld, MD, MPH; David Wilson, MD; Jill Siegfried, PhD; Frank Sciurba, MD, FCCP; and Steven Shapiro, MD**, explored this question. They studied lung cancer related to radiographic emphysema in tobacco-exposed participants of the Pittsburgh Lung Cancer Screening Study (PLuSS), and demonstrated an independent association between a computer tomography (CT) emphysema measure and lung cancer. This important result has led to the plan to study inflammation as a common pathway linking cigarette smoking to both lung cancer and emphysema.



- 1 Chlebowski RT, Kuller LH, Prentice RL, Stefanick ML, Manson JE, Gass M, Aragaki AK, Ockene JK, Lane DS, Sarto GE, Rajkovic A, Schenken R, Hendrix SL, Ravdin PM, Rohan TE, Yasmeen S, Anderson G, Investigators WHI. Breast cancer after use of estrogen plus progestin in postmenopausal women. *N Engl J Med.* 2009;360(6):573-87.
- 2 Andriole GL, Crawford ED, Grubb RL 3rd, Buys SS, Chia D, Church TR, Fouad MN, Gelmann EP, Kvale PA, Reding DJ, Weissfeld JL, Yokochi LA, O'Brien B, Clapp JD, Rathmell JM, Riley TL, Hayes RB, Kramer BS, Izmirlian G, Miller AB, Pinsky PF, Prorok PC, Gohagan JK, Berg CD; PLCO Project Team. Mortality results from a randomized prostate-cancer screening trial. *N Engl J Med.* 2009 Mar 26;360(13):1310-9.

KEY INVESTIGATORS



JAN BEUMER, PharmD, PhD

Assistant professor of pharmaceutical sciences and director of the Clinical Pharmacology Analytical Facility



THOMAS KENSLER, PhD (top, left)

Professor of pharmacology and chemical biology and member of the UPCI Cancer Epidemiology, Control, and Prevention Program



LEWIS KULLER, MD, DrPH (top, right)

Professor of epidemiology at the University of Pittsburgh Graduate School of Public Health and a member of the UPCI Cancer Epidemiology, Prevention, and Control Program

SHIVENDRA SINGH, PhD

Professor of pharmacology and chemical biology, director of UPCI basic research, and member of the UPCI Cancer Epidemiology, Prevention, and Control Program

ROBERT E. SCHOEN, MD, MPH

Professor of medicine and epidemiology at the University of Pittsburgh and a member of the UPCI Cancer Epidemiology, Prevention, and Control Program

JOEL WEISSFELD, MD, MPH (bottom, left)

Professor of epidemiology and the leader of the UPCI Cancer Epidemiology, Prevention, and Control Program

Biobehavioral Factors in Cancer

The Biobehavioral Medicine in Oncology Program, led by **Dana H. Bovbjerg, PhD**, promotes innovative interdisciplinary research focused on the role of the mind and brain in cancer risk, treatment, and survival. Investigators are exploring the ways stress and behavioral and biological issues affect the development of cancer and the effects cancer treatment may have on patients, families, and caregivers.

Psycho-educational Intervention

Cancer patients experience numerous disease- and treatment-related symptoms, so optimal symptom management is essential. With funds from the National Cancer Institute (NCI), **Heidi Donovan, PhD, RN**, assistant professor of acute and tertiary care, University of Pittsburgh School of Nursing, and a member of the UPCI Biobehavioral Medicine in Oncology Program, and colleagues developed an innovative psycho-educational intervention called WRITE Symptoms.® The group is testing this web-based delivery system that allows patients to interact with a research nurse using their own private message boards. The goal is to train patients to be their own self-advocates in taking better control over their symptoms by fostering better communication with their health care team. With funding from the National Institutes of Health (NIH), Dr. Donovan's team is currently studying this intervention for women with ovarian cancer.

"I've never looked at my symptoms this way before," says one patient. "I've given myself permission to be tired, and I don't measure myself against pre-cancer levels. I do less, and I nap at work from time to time, and that's okay. That's a huge step for me."

"I think the process of rethinking strategies and your input was helpful," says another patient. "You reminded me of several possibilities that somehow had gotten lost in all the other health matters — there were no miracle solutions offered, but I didn't expect any."

Breast Cancer Chemotherapy Impairs Cognitive Function

With more women surviving breast cancer, studies are finding that survivors face new challenges, such as changes in memory and attention. **Catherine Bender, PhD, RN, FAAN**, associate professor of health and community systems, University of Pittsburgh School of Nursing, and member of the UPCI Biobehavioral Medicine in Oncology Program,

whose research is supported by the NCI, studies changes in cognitive function due to breast cancer and therapy. "We found that women who underwent breast cancer chemotherapy for 18 months had poorer cognitive function compared to healthy women," she says. Now she intends to study whether cognitive function continues to decline through the remaining years of therapy and, most importantly, if there is improvement in cognitive function after conclusion of therapy.

Smoking and Alcohol Use May Decrease Adherence to Oral Medications

Use of oral medications is essential for breast cancer treatment and prevention, but a drug is doomed to failure if the patient forgets to take it. **Stephanie Land, PhD**, research associate professor of biostatistics, and member of the UPCI Biobehavioral Medicine in Oncology Program, studies why some women don't take their medications. "Is this non-adherence related to obesity, smoking cigarettes, drinking alcohol, or low levels of fitness activity?" she asked.

Dr. Land has found no significant associations with obesity or fitness; however, women who were cigarette smokers or who drank alcohol failed to take their medication consistently. Dr. Land believes these patients might need greater adherence support. "It is also possible that this is one more way in which smoking causes cancer, because women who smoke are less likely to take advantage of medications," she says.

Consumer Health Informatics: Empowering Patients With Health Information Technology

Health information technology (HIT) applications, such as electronic health records (EHRs) and personal health records (PHRs) are becoming a part of routine patient care, and their use is sure to increase over time. Clinical psychologist **Ellen Burke Beckjord, PhD, MPH**, assistant professor of psychiatry and member of the UPCI Biobehavioral Medicine in Oncology Program, wants to learn how patients can access health information technology to improve their well-being.

"There is a lot of evidence that patients believe in the potential of HIT to improve health care quality, and they want their health care providers to explore what HIT has to offer," Dr. Beckjord says. Her research, which is supported by the NCI and LIVESTRONG,® the Lance Armstrong Foundation, shows that cancer survivors want healthcare providers to

share information electronically with each other, and that patients want to retrieve their own electronic health information.

Dr. Beckjord, who recently joined UPCI from the RAND Corp., will expand this research with cancer survivors at UPCI and at the Magee-Womens Hospital of UPMC LiveWell Survivorship Clinic, as well as explore new therapeutic approaches to improve quality of life among cancer survivors. “Patients are eager to use HIT applications like PHRs and even want to use HIT as a means to share their anonymous health information with researchers,” she says. “But they are most interested in how HIT can enhance — not replace — the personal relationships they have with their health care team.”

Hookah Smoking Becoming More Popular Among American Teenagers

Although cigarette smoking has declined in the United States, a new method of tobacco smoking — the hookah — is rapidly emerging. Hookah tobacco smoke contains significant amounts of toxicants, such as tar, nicotine, and carcinogens. “A typical one-hour-long hookah smoking session involves inhaling 100 to 200 times the volume of smoke inhaled with a single cigarette, and an average hookah tobacco smoking session delivers 36 times the tar of a single cigarette,” says **Brian A. Primack, MD, EdM, MS**, assistant professor of medicine and pediatrics at the University of Pittsburgh, and member of the UPCI Biobehavioral Medicine in Oncology Program. “Despite this risk, widespread adoption of this form of tobacco use is becoming acceptable,” he says. Dr. Primack is an international expert in this field. He has found that hookah tobacco smoking is more popular than cigarette smoking in certain areas of the country, and that it is increasing in popularity, especially among U.S. junior high and high school students. Thanks to new funds from the NCI, Dr. Primack is studying why American adolescents take up hookah smoking, so that preventive actions can be taken against what could be the next global tobacco epidemic.

KEY INVESTIGATORS

ELLEN BURKE BECKJORD, PhD, MPH

Assistant professor of psychiatry and member of the UPCI Biobehavioral Medicine in Oncology Program

CATHRINE BENDER, PhD, RN, FAAN

Associate professor of health and community systems, University of Pittsburgh School of Nursing and member of the UPCI Biobehavioral Medicine in Oncology Program

DANA H. BOVBJERG, PhD

Leader, UPCI Biobehavioral Medicine in Oncology Program



Top: Dr. Ellen Beckjord is studying whether access to health information technology can improve a cancer patient's sense of well-being and the quality of care he or she receives.

Bottom: Dr. Brian Primack is studying the effects of tobacco smoking using the hookah, a type of water pipe that is becoming increasingly popular among American teenagers.

HEIDI DONOVAN, PhD, RN

Assistant professor of acute and tertiary care, University of Pittsburgh School of Nursing, and a member of the UPCI Biobehavioral Medicine in Oncology Program

STEPHANIE LAND, PhD

Associate professor of biostatistics, and member of the UPCI Biobehavioral Medicine in Oncology Program

BRIAN A. PRIMACK, MD, EdM, MS

Assistant professor of medicine and pediatrics, University of Pittsburgh and member of the UPCI Biobehavioral Medicine in Oncology Program

UPCI Shared Facility Highlights

Immunologic Monitoring and Cellular Products Laboratory

Directed by **Lisa Butterfield, PhD**, associate professor of medicine, surgery and immunology, the Immunologic Monitoring and Cellular Products Laboratory (IMCPL) is a crucial resource for the University of Pittsburgh Cancer Institute (UPCI) and national clinical researchers who administer therapeutic cell products or vaccines to cancer patients and wish to evaluate the immune effects of these treatments or other types of therapeutic interventions.

The IMCPL brings together two distinct but interrelated service types — immunologic monitoring and cellular products — into one laboratory. The Cellular Products Laboratory (CPL) is dedicated to the preparation of biological products, such as modified patient cells used in cancer vaccines and cancer cellular and gene therapy. The Immunologic Monitoring Laboratory (IML) provides a broad range of state-of-the-art tests that enable clinical investigators to monitor and evaluate immunologic functions in cancer patients, predict patient prognosis, examine the effects of a novel therapeutic agent, or explore the biological reasons for why a patient may or may not respond to a particular treatment.

Supported partially by the UPCI Cancer Center Support Grant, IMCPL provides essential support for numerous UPCI and national innovative clinical trials. For example,

Pawel Kalinski, MD, PhD, a pioneer in the development of optimized dendritic cell (DC) cancer vaccines, has used the IMCPL extensively for preparing new cell-based vaccines. In collaboration with several UPCI clinicians, these novel anti-cancer treatments are being tested in multiple clinical trials for patients with colorectal cancer by **David Bartlett, MD**; brain cancer by **Hideho Okada, MD, PhD**, and **Frank Lieberman, MD**; melanoma by **John Kirkwood, MD**; and prostate cancer by **Gurkamal Chatta, MD**. Additional trials will be started in Spring 2011 in ovarian and endometrial cancers by **Robert Edwards, MD**; and colorectal cancer by **Amer Zureikat, MD**, **Herbert J. Zeh, MD, PhD**, and Dr. David Bartlett.

While several patients already have shown promising clinical responses to their personalized vaccines, the IMCPL continues to carefully analyze these patient-specific treatments, and to monitor patient immune responses, in order to fully characterize the effects and potential benefits of the treatments. In addition, the IMCPL generates cancer vaccines that are genetically engineered to express tumor-specific proteins and other genes that help patients' immune systems recognize and attack their cancers.

Founding director **Theresa L. Whiteside, PhD**, professor of pathology, immunology, and otolaryngology, has played a critical role in the growth and success of IMCPL during her leadership from 1986 until 2010. In addition, she contributed substantially toward the construction of the new IMCPL laboratories at Hillman Cancer Center, which opened in 2002, and continues as an active research scientist.

Dr. Lisa Butterfield (right) directs the Immunologic Monitoring and Cellular Products Laboratory (IMCPL), used by colleagues such as Dr. Pawel Kalinski (left), who uses the lab for preparing new cell-based vaccines. Dr. Theresa Whiteside (center) is the founding director of the IMCPL.

KEY INVESTIGATORS

LISA BUTTERFIELD, PhD

Director of IMCPL, associate professor of medicine, surgery, and immunology

PAWEL KALINSKI, MD, PhD

Associate professor of surgery

THERESA L. WHITESIDE, PhD

Founding director of IMCPL, professor of pathology, immunology, and otolaryngology



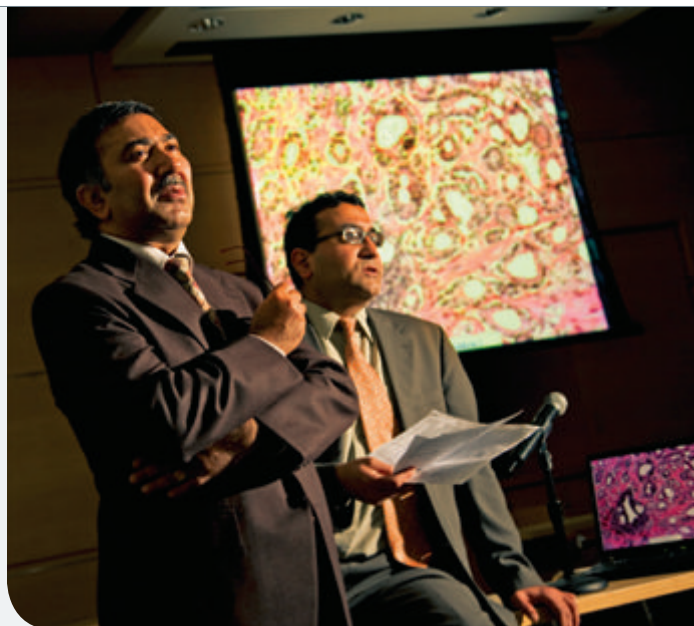
Tissue and Research Pathology Services (TARPS)

Biological samples from cancer patients, which are carefully collected, preserved, and annotated, are an essential component of quality cancer research. Tissue and Research Pathology Services (TARPS) is a UPCI shared facility, supported partially by the Cancer Center Support Grant, which procures and disburses tissues from consented patients at UPMC. TARPS use current cutting-edge banking and tissue-filing systems to ensure that research materials are of the highest quality. In addition, TARPS provides routine and cutting-edge research pathology support services. This service is one of the most heavily used UPCI shared facilities and has collected more than 40,282 tissue and biological specimens from 4,660 cases. These high-quality biological samples are essential for assessing new cancer treatments and detections, which improve cancer therapies.

TARPS also provides support to major research projects, such as the Lung Specialized Program of Research Excellence (SPORE), Early Disease Research Network (EDRN)-related research efforts, and several other UPCI cancer research programs. The TARPS tumor tissues are of such high quality that they are being used by The Cancer Genome Atlas (TCGA), which is a large-scale collaborative ongoing project of the NCI and the National Human Genome Research Institute, to understand the genomic changes that occur in cancer. The University of Pittsburgh has contributed more than 600 cases and 15 tumor types to the TCGA initiative, according to **Rajiv Dhir, MD**, professor of pathology and director of the TARPS.

Although the TARPS facility has achieved significant milestones in tissue accrual and disbursement and research support, there are new exciting frontiers on the horizon. Three major new initiatives that will further boost the research support capabilities of TARPS are:

- Biopecimen Inventory and Operations System (BIOS)**
 This web-based system was designed and implemented to allow integration of demographic and pathology information with the tissue resources. It was developed by Enterprise Clinical Software and Pathology Informatics with assistance from the Department of Biomedical Informatics and the Health Sciences Tissue Bank.



The BIOS was recently activated, and is currently in use throughout TARPS.

- Nuance Multi-spectral Imaging System (Quantum Dots)**
 TARPS is currently implementing this methodology for the simultaneous localization of up to four markers on tumor tissues. The advantage of using quantum dots by this system is that it can calculate the amount of a specific label and compare it with other markers of interest.
- Whole Slide Imaging (WSI)**
 WSI provides digital images of the entire library of histological slides at high resolution, which can be made available to pathologists on a network or locally. By imaging large numbers of slides automatically at high resolution, modern automated WSI systems have the potential to become useful tools in pathology practice. **Anil Parwani, MD, PhD**, associate professor of pathology and director of anatomic pathology and pathology informatics, provides scientific expertise and evaluation for WSI.

Dr. Rajiv Dhir (left) is director of Tissue and Research Pathology Services (TARPS), a UPCI shared facility which procures and disburses tissues from consented patients at UPMC. Dr. Anil Parwani provides scientific expertise and evaluation for Whole Slide Imaging, a library of high-resolution digital images, offered as a research support capability through TARPS.

KEY INVESTIGATORS

RAJIV DHIR, MD

Professor of pathology and director of TARPS

ANIL PARWANI, MD, PhD

Associate professor of pathology and director of anatomic pathology and pathology informatics

New Women's Cancer Research Center Fosters Collaboration Among Experts



Above: The Women's Cancer Research Center comprises a multidisciplinary team of researchers and clinicians who are collaborating to quickly translate research findings into better therapies for cancer patients.

Opposite: Dr. Robert Edwards (left) and Dr. Adrian Lee (right) codirect the Women's Cancer Research Center; Dr. Steffi Oesterreich, center, is director of education at the WCRC.

The newly established Women's Cancer Research Center (WCRC), a collaboration between the University of Pittsburgh Cancer Institute (UPCI) and the Magee-Womens Research Institute (MWRI), will combine the expertise of a number of researchers and clinicians from a variety of disciplines, to foster novel research ideas and collaborative efforts toward the common goal of translating research findings into improved therapies for patients in the clinic.

The WCRC will take advantage of the tremendous clinical strength of UPCI and UPMC Cancer Centers in breast and gynecological cancers, as well as emerging basic and population sciences investigators in these areas. One high-priority area for the WCRC will be research on molecular characterization of tumors in order to match specific treatments to specific patients. Such personalization of medicine is expected to have greater response rates and fewer unnecessary side effects for cancer patients. The WCRC's overall goal is to reduce the incidence of and death from women's cancers, and will be codirected by **Adrian V. Lee, PhD**, professor of pharmacology and chemical biology, and **Robert Edwards, MD**, professor of obstetrics, gynecology, and reproductive sciences. "The center allows us to bring together people from different disciplines to reach a common goal," says Dr. Lee, newly appointed director of the WCRC. "To do translational research like this, you need to have cancer biologists, oncologists, surgeons, pathologists, biostatisticians, medical oncologists, and other scientists. You need to bring all these people together and help them to speak the same language and to foster research ideas. It really takes a village to accomplish it."

Dr. Lee joined the University of Pittsburgh as professor of pharmacology and chemical biology from the Baylor College of Medicine in Houston, where he had been a faculty member since 1999. An extremely well-regarded investigator in the molecular and cellular biology of breast cancer, Dr. Lee is especially well known for his work targeting the insulin-like growth factor (IGF) pathway as a potential new approach to breast cancer treatment.

His laboratory is the central reference laboratory for tissue biomarker studies for one of the leading anti-IGF drugs currently in clinical trials. Dr. Lee has published more than 100 peer-reviewed articles and serves on numerous peer-review panels. He serves on the scientific advisory committee of Susan G. Komen for the Cure,[®] and the executive committee for the annual San Antonio Breast Cancer Symposium.

Dr. Lee was integral in the development of the Breast Center at Baylor, and was an active member of the highly regarded Specialized Program of Research Excellence (SPORE) which was funded continuously for 19 years by the National Cancer Institute. One of the major goals of the WCRC is to become a nationally and internationally recognized center for translational studies on women's cancers. Toward this goal, the WCRC is developing federally funded multidisciplinary research and training programs.

The other codirector of the WCRC is Dr. Robert Edwards, who serves as the director of gynecologic research and director of the Ovarian Cancer Center of Excellence for the Magee-Womens Gynecologic Cancer Program of UPMC Cancer Centers, and as coleader of gynecologic oncology at UPCI.

Recently, PUMA[®] awarded funds through its Project Pink program, which will directly benefit the WCRC. "The money from Project Pink will be used toward the purchase of a new laser



capture microdissection device that will give scientists the unique ability to isolate and capture single cancer cells and help dig into the roots of the disease,” says Dr. Edwards. “This equipment will allow future physician-scientists to excel in their investigations. We applaud PUMA’s efforts through Project Pink, and look forward to working with the program as we improve the health of countless women.”

Also joining UPCI is **Steffi Oesterreich, PhD**, director of education at the WCRC. An expert in estrogen receptor biology and action, her research has been supported by the National Institutes of Health and the Department of Defense. She has received many awards and recognition for her work, such as the Women in Endocrinology award. In addition to her research focus on endocrine treatment response in breast cancer, Dr. Oesterreich is especially interested in training young researchers in the area of translational women’s cancer research, particularly in performing research with direct clinical relevance. “I am extremely excited to have moved to Pittsburgh,” says Dr. Oesterreich. “The WCRC represents a unique and powerful opportunity to make significant advances in women’s cancer research. I also love Pittsburgh, which has much to offer — outstanding culture, sports, nature, and very welcoming, friendly, and bright people.”

KEY INVESTIGATORS

ROBERT EDWARDS, MD

Codirector of the WCRC, professor of obstetrics, gynecology, and reproductive sciences, director of gynecologic research and director of the Ovarian Cancer Center of Excellence for the Magee-Womens Gynecologic Cancer Program of UPMC Cancer Centers, and coleader of gynecologic oncology at UPCI

ADRIAN V. LEE, PhD

Codirector of the WCRC, professor of pharmacology and chemical biology

STEFFI OESTERREICH, PhD

Director of education at the WCRC, professor of pharmacology and chemical biology

Renowned UPCI Scientist and Mentor Merrill Egorin, MD, Leaves Behind a Distinguished Legacy

In August 2010, the University of Pittsburgh Cancer Institute (UPCI) family lost one of its most passionate and dedicated scientists when **Merrill J. Egorin, MD**, professor of medicine and pharmacology, and biology at the University of Pittsburgh School of Medicine, and coleader of UPCI's Molecular Therapeutics and Drug Discovery Program, died from complications of multiple myeloma. Dr. Egorin had endured five years of therapy, including a stem cell transplant, chemotherapy, targeted agents, surgery, and radiation.

"It is both sad and ironic that he lost his life to cancer, a disease that he had spent a lifetime trying to understand and treat," says Nancy E. Davidson, MD, director of UPCI and the UPMC Cancer Centers. "Merrill was one of an increasingly rare breed — a classic cancer pharmacologist. As a researcher, he had a laser-like and lifelong focus on the development and application of antineoplastic agents."

A proud graduate of Johns Hopkins and the Osler Medical Service at the Johns Hopkins Hospital, Dr. Egorin trained in medical oncology and pharmacology at the Baltimore Cancer Research Center during the 1970s. He became a staff physician in 1981 at the University of Maryland Hospital where he ultimately rose to the position of professor of medicine, pharmacology, and experimental therapeutics and oncology, and served as the head of the Division of Developmental Therapeutics of the University of Maryland Cancer Center. A native of Baltimore and a staunch Orioles fan, Dr. Egorin moved to Pittsburgh in 1998 to lead UPCI's clinical and preclinical pharmacology activities.

In addition to carrying out his own research, Dr. Egorin was passionate about mentoring the next generation of cancer researchers. He believed that one of the most important

responsibilities for established researchers is the nurturing and support of junior investigators, and no one was more engaged in this process than Dr. Egorin. Thanks to the time and energy he dedicated to teaching, many of Dr. Egorin's students now are independent scientists and physicians in their own right.

Upon his passing, and in his spirit of mentorship, a summer student research program fund was established to support the educational development of the next generation of scientists. In addition, an annual Merrill J. Egorin Excellence in Scientific Leadership Award was established to honor individuals who exude the traits that Dr. Egorin was best known for: his medical expertise, scientific passion, and boundless enthusiasm for research, patient care, and teaching.

Dr. Egorin was highly successful by the traditional benchmarks of an academic career. He contributed scores of articles to medical journals and served as a reviewer or held other editorial positions with many journals. He was a long-time editor of *Cancer Chemotherapy and Pharmacology*. His research garnered millions of dollars in funding from the National Institutes of Health and pharmaceutical companies. His proudest accomplishment was becoming the American Society of Clinical Oncology (ASCO) Translational Professor in 2009, a title signifying recognition from his peers for his scientific and mentoring expertise. Following his death, ASCO announced that in 2011, the distinguished award would be renamed in memory of Dr. Egorin.

Dr. Egorin also will be remembered for his quirkiness. Clad routinely in a bow-tie, he was equally at home with his lava lamp, National Bohemian beer, and everything lacrosse. "Merrill could both honor the dedication and discipline that is the hallmark of a good doctor and also 'embrace the funk,' to use his own words, to make the challenges of medicine bearable," says Dr. Davidson.

Dr. Egorin is survived by his wife, Karen, his two children, Noah and Melanie, and four grandchildren. He passed away the day after his 41st wedding anniversary, with members of his biological and medical families at his side on the oncology floor of UPMC Shadyside, where he had worked for a dozen years.

"Merrill believed, as I do, that great science leads to good medicine," adds Dr. Davidson. "His commitment to cancer patients, his laboratory, his students, UPCI, and Pittsburgh will be greatly missed."

Dr. Merrill Egorin served as a mentor to the next generation of researchers, including Drs. Shannon Puhalla and Hussein Tawbi.



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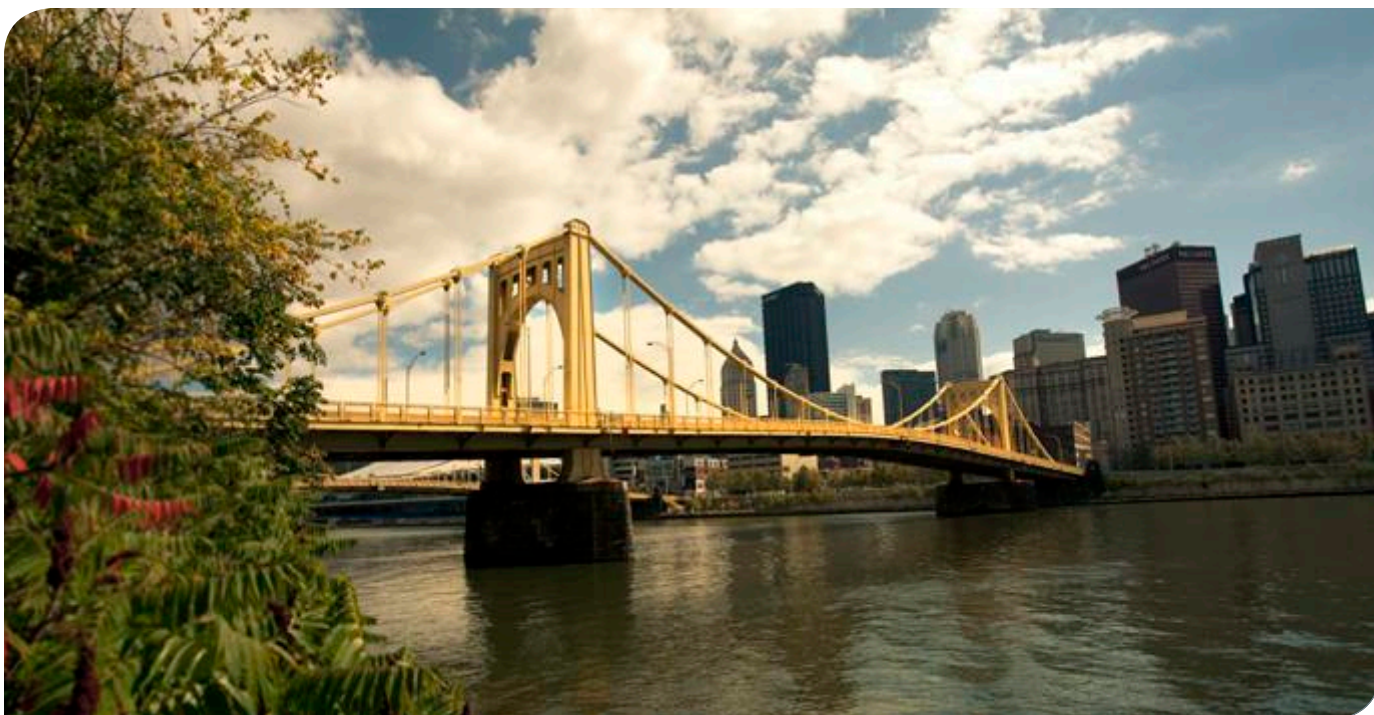
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AS OF DEC. 31, 2010

★ Radiation Oncology Centers

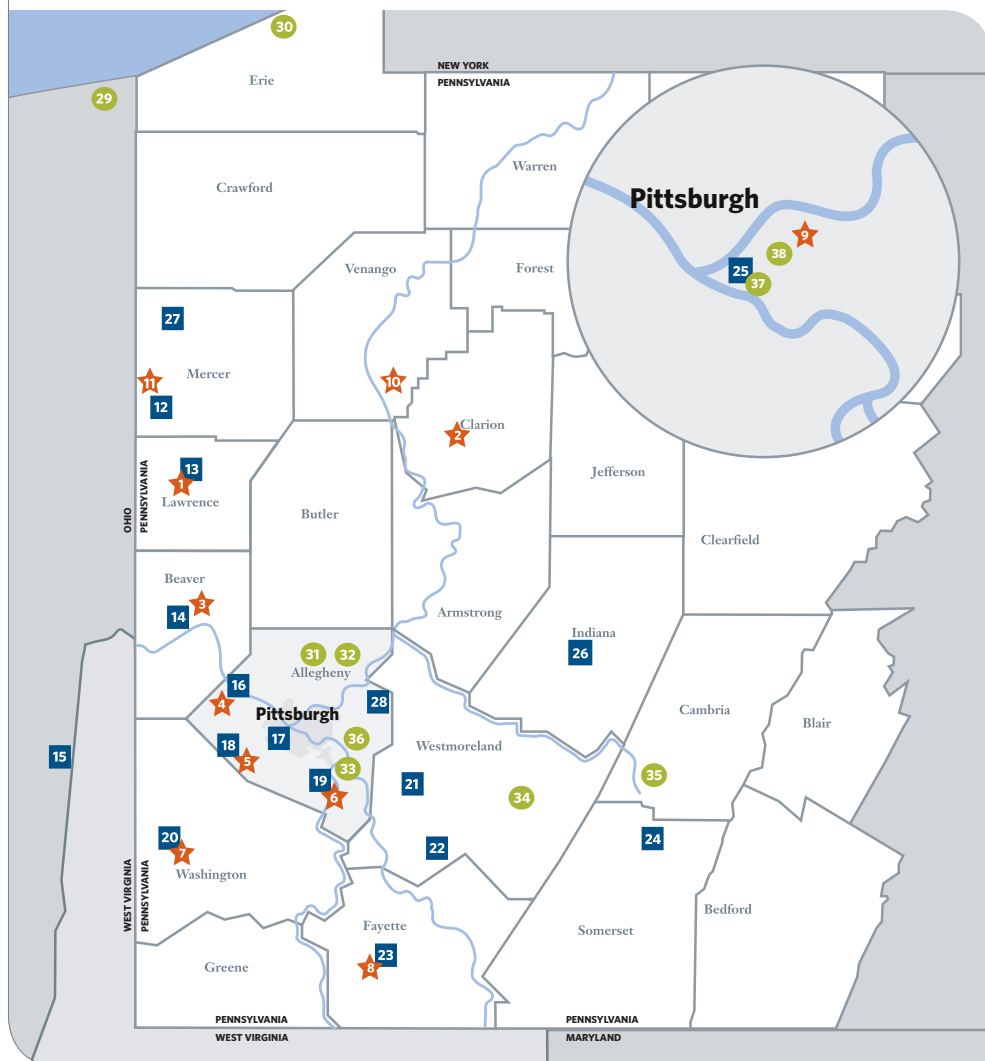
- 1 UPMC/Jameson Cancer Center
- 2 UPMC Cancer Center at Clarion Hospital
- 3 UPMC/HVHS Cancer Center at Beaver
- 4 UPMC/HVHS Cancer Center at UPMC West
- 5 UPMC Cancer Center at St. Clair Hospital
- 6 Radiation Oncology Center at Jefferson Regional Medical Center
- 7 UPMC and The Washington Hospital Cancer Center
- 8 Robert E. Eberly Pavilion
- 9 Mary Hillman Jennings Radiation Oncology Center
- 10 UPMC Cancer Center at UPMC Northwest
- 11 UPMC Cancer Center at UPMC Horizon

■ Medical Oncology Centers

- 12 UPMC Cancer Center at Horizon (Shenango)
- 13 UPMC Cancer Center, NewCastle
- 14 UPMC Cancer Center, Beaver
- 15 UPMC Cancer Center, Steubenville
- 16 UPMC Cancer Center, Sewickley Medical Oncology
- 17 UPMC Cancer Center, Kennedy
- 18 UPMC Cancer Center, Upper St.Clair
- 19 UPMC Cancer Center at Jefferson Regional Medical Center
- 20 UPMC Cancer Center, Washington
- 21 Arnold Palmer Pavilion at Oakbrook Commons
- 22 Arnold Palmer Pavilion at Mt. Pleasant
- 23 UPMC Cancer Center, Uniontown
- 24 UPMC Cancer Center, Windber
- 25 UPMC Cancer Center at UPMC Mercy
- 26 UPMC Cancer Center, Indiana
- 27 UPMC Cancer Center, Greenville
- 28 UPMC Cancer Center at UPMC East, Oxford Drive

● Dual Centers

- 29 The Regional Cancer Center, Ashtabula
- 30 The Regional Cancer Center, Erie
- 31 UPMC Cancer Center at UPMC Passavant
- 32 UPMC Cancer Center, Natrona Heights
- 33 UPMC Cancer Center at UPMC McKeesport
- 34 Arnold Palmer Pavilion at Mountain View Medical Park
- 35 John P. Murtha Regional Cancer Center
- 36 UPMC Cancer Center at UPMC St. Margaret
- 37 UPMC Cancer Center at Magee-Womens Hospital of UPMC
- 38 Hillman Cancer Center





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Pittsburgh, PA 15232
www.UPMCCancerCenters.com
www.UPCI.UPMC.edu

UPMC Cancer Centers offers cancer patients exceptional care and innovative treatments through an extensive network of care locations throughout western Pennsylvania. UPMC Cancer Centers works in partnership with the University of Pittsburgh Cancer Institute (UPCI), western Pennsylvania's only National Cancer Institute-designated Comprehensive Cancer Center, which is responsible for all cancer-related academic and research activities at the University of Pittsburgh. Together, UPMC Cancer Centers and UPCI are committed to providing the latest advances in cancer research, prevention, diagnosis, and treatment throughout the region.

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