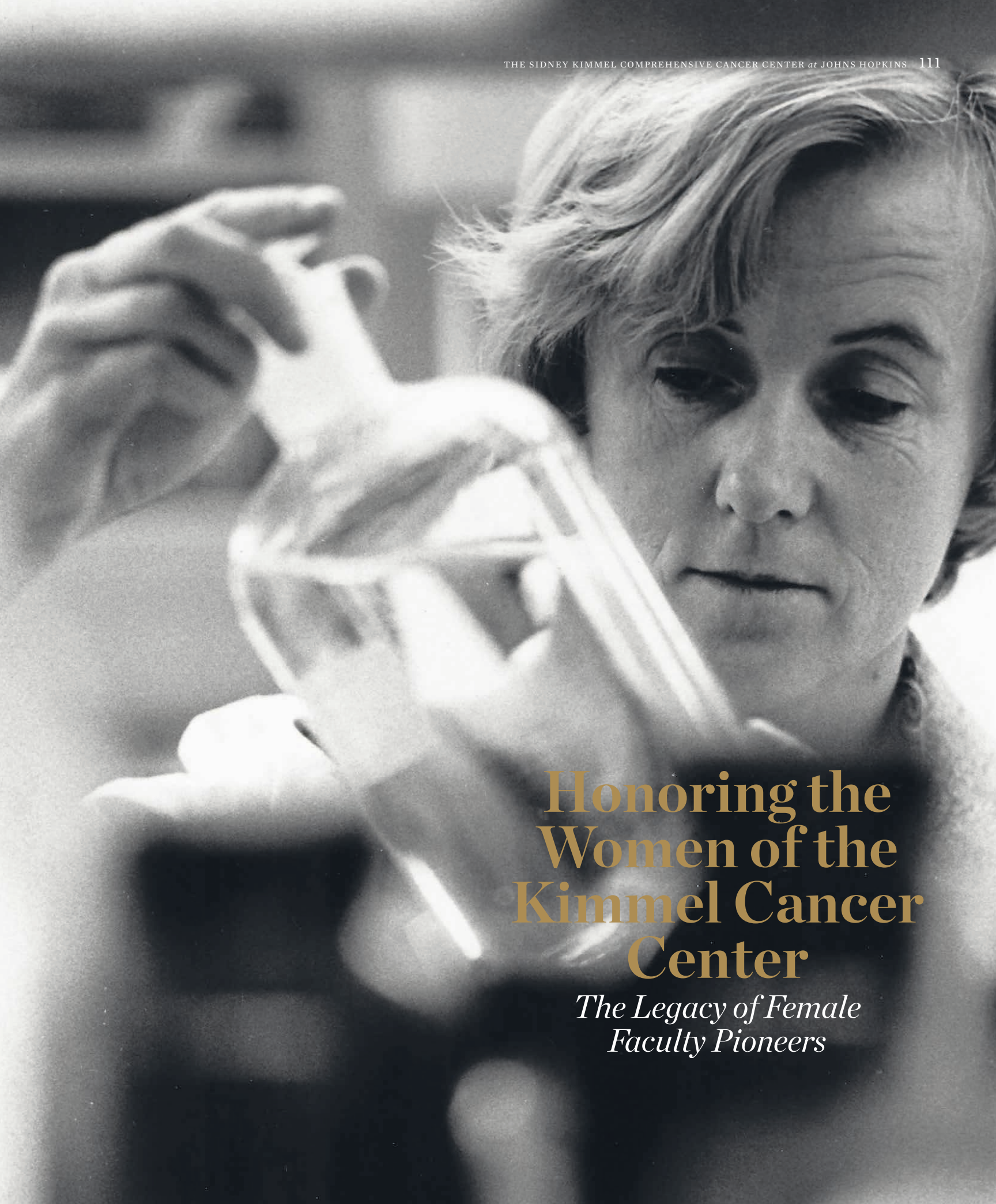


2020s

Entering the digital age of cancer medicine, advanced computer technologies, such as machine learning, are making sense of the billions of data points generated in modern cancer research and medicine to predict the best treatment options for each patient, understand disparities and close gaps, improve cancer detection, and reveal novel ways to combat cancer.



**Honoring the
Women of the
Kimmel Cancer
Center**

*The Legacy of Female
Faculty Pioneers*

There is an unbreakable connection from our earliest female faculty members to our most recent recruits. Great pioneers and leaders, such as **Paula Pitha-Rowe**, who joined the Cancer Center in 1971 as its first basic scientist, **Judy Karp**, who came in 1973 as one of the first three oncology fellows, and **Brigid Leventhal**, recruited in 1976 to lead pediatric oncology, were role models and mentors who helped pave the way for our most recent female faculty members.

“These women were significantly productive in their own careers, and they helped shape our Cancer Center, creating an environment that made it better for the women who came after them. They helped us succeed,” says **Elizabeth Jaffee**, deputy director of the Kimmel Cancer, the eighth woman to join the Cancer Center, and the 88th woman to earn a professorship at Johns Hopkins.

Major scientific advances typically do not come from one discovery at one moment in time. Instead, they unfold over many years. The women who pioneered technologies and advances against cancer in the early years of our Cancer Center trained many of today’s leaders in cancer medicine, and they helped create a foundation upon which some of the most significant discoveries in the history of the Kimmel Cancer Center were made.

started the Cancer Center’s viral oncology program, considered among the best in the world. She was interested in how viruses stimulated the immune system, and her research and guidance helped advance the technologies in cell engineering that allowed our researchers to develop the first therapeutic cancer vaccines. Pitha-Rowe also oversaw the Cancer Center’s training grant, creating the educational environment for basic research and shaping the collaborative, intellectual discourse that remains foundational to our Cancer Center. She died in 2015.

Brigid Leventhal was the Kimmel Cancer Center’s first director of pediatric oncology, joining the Kimmel Cancer faculty in 1976. She launched the pediatric oncology inpatient and outpatient clinics. She was a pioneer in the prevention of treatment-related toxicities, working with pediatric radiation oncologist Moody Wharam, to scale back treatment for Hodgkin’s lymphoma to prevent side effects, including second cancers later in life. In 1984, she helped found the Pediatric Oncology Group, which focused on collaborative research of pediatric cancers. A founding member and president of the Women in Cancer Research Council of the American Association for Cancer Research, she was honored with the Federal Women’s Award in 1974 and the Outstanding Career Woman of the National Council of Women in 1979. She died in 1994.



LEVENTHAL

“THESE WOMEN WERE SIGNIFICANTLY PRODUCTIVE IN THEIR OWN CAREERS, AND THEY HELPED SHAPE OUR CANCER CENTER, CREATING AN ENVIRONMENT THAT MADE IT BETTER FOR THE WOMEN WHO CAME AFTER THEM. THEY HELPED US SUCCEED.”



PITHA-ROWE

Paula Pitha-Rowe was the Cancer Center’s first basic science researcher and among the school of medicine’s first female professors. She was an internationally recognized researcher who helped define the biology of interferon, proteins produced as part of the body’s response to inflammation. She started her laboratory at the Cancer Center in 1971, leading to a major breakthrough with the development of a mechanism to detect interferon-encoding RNA, allowing for the cloning of interferon and paving the way for its clinical use. She also identified viruses that engaged the interferon systems, and

S. Diane Hayward joined the Cancer Center faculty in 1976 and focused her research on virus-associated cancers. She twice received Merit awards from the National Cancer Institute for her research on Epstein-Barr virus and was recognized by the International Association for Research on Epstein-Barr Virus and Associated Diseases. Her laboratory studied the ability of Epstein-Barr virus and Kaposi’s sarcoma-associated herpesvirus to manipulate cell signaling pathways. She was the co-director of the Cancer Center’s Viral Oncology Program.



HAYWARD



MANN

Risa Mann came to Johns Hopkins in 1977 as a cancer researcher and pathologist after a fellowship at the National Cancer Institute. She was a member of the National Pathology Panel for Lymphoma clinical studies involved in the classification of lymphomas for the National Cancer Institute. She also researched the association of the Epstein-Barr virus (EBV) with lymphoma and helped develop methods to detect EBV in clinical samples. She was a member of the Education Committee of the United States and Canadian Academy of Pathology. She died in 2015.



FORASTIERE

Arlene Forastiere is an internationally recognized expert in esophageal cancer and in head and neck cancer management. She made major contributions to the development of combined modality therapy, and establishing standards of care for the management of these upper aerodigestive cancers. In 2003, Forastiere reported on a combined treatment she developed that allowed many patients with laryngeal cancers to keep their voices. In an eight-year trial of more than 500 patients, Forastiere showed that by giving chemotherapy and radiation therapy at the same time, many patients were able to retain their larynxes and preserve their voices. Although some of the study participants required laryngectomies, 85% of patients remained disease-free after receiving the combined drug/radiation therapy. She served as chair of the National Comprehensive Cancer Network's Head and Neck Cancer Guidelines Panel.



VOGELSANG

Georgia Vogelsang focused on managing graft-versus-host disease, a major complication of bone marrow transplantation, including harnessing its antitumor potential. Her major contributions have been in mentoring and teaching, with dozens of trainees now in universities around the world.



DAVIDSON

Nancy Davidson is a former director of the Kimmel Cancer Center's breast cancer program and breast cancer research chair in oncology. She helped decipher the role of the estrogen receptor gene in driving breast cancer and in characterizing pathways by which cancer cells die, with the aim of developing new therapies to target the pathways. She oversaw the development of preclinical studies, including the role of DNA methylation in estrogen and progesterone receptor genes, and was lead investigator on many practice-changing breast cancer clinical trials. She was chair of the Breast Committee of the Eastern Cooperative Oncology Group and co-founder of the Translational Breast Cancer Research Consortium. She served as president of

both the American Society of Clinical Oncology and the American Association for Cancer Research. Davidson was director of the University of Pittsburgh Cancer Institute, and is currently director of clinical oncology at the Fred Hutchinson Cancer Center.

Carol Grieder, the Daniel Nathans Professor and Director of the Department of Molecular Biology and Genetics, and colleague **Elizabeth Blackburn** discovered the enzyme telomerase. In 2009, they were awarded the Nobel Prize in Physiology and Medicine for the discovery. Grieder's pioneering research of telomeres, the protective end caps on chromosomes, showed that telomerase restores telomeres and protects them from damage. The connections of telomeres and telomerase to cancer development and progression is a major area of research.



GRIEDER

Zaver Bhujwala is dedicated to the applications of molecular imaging to understand and target cancer and the tumor microenvironment. She is a fellow of the International Society of Magnetic Resonance in Medicine, the American Institute of Biomedical Engineers and the World Molecular Imaging Society. She is director of the Cancer Molecular and Functional Imaging Program. She is also chair of the Career Development of Advisory Committee for the Department of Radiology and Radiological Science.



BHUJWALLA

Cynthia Sears is the Bloomberg-Kimmel Professor of Cancer Immunotherapy and leads the Microbiome Program at the Kimmel Cancer Center's Bloomberg-Kimmel Institute for Cancer Immunotherapy. She is an expert on the gut microbiome — the community of microorganisms that aid with digestion, metabolism and immunity, and how certain bacteria can cause inflammation that leads to cancer. Among Sears' discoveries are colon biofilms made up of bacteria that are able to invade the mucus that protects the cells lining the colon. She is the first to systematically study the potential role of biofilms in the development of colon cancer.



SEARS



SUKUMAR

Saraswati Sukumar is the Barbara Rubenstein Professor of Oncology and former director of the Kimmel Cancer Center's Breast Cancer Program. Her research has led to a test called the Liquid Biopsy for Breast Cancer Methylation (LBx-BCM).

In 4½ hours, it can detect methylation, a type of chemical tag, in one or more of nine genes altered in breast cancers, and may be particularly useful in improving survival in poorer countries. Sukumar has also delivered a method that uses a tiny catheter to deliver anticancer drugs directly into breast ducts, where cancer most often originates.



JAFFEE

Elizabeth Jaffee is the Dana and Albert "Cubby" Broccoli Professor of Oncology. She is deputy director of the Johns Hopkins Kimmel Cancer Center, co-director of the Skip Viragh Center for Pancreas Cancer Clinical Research and Patient Care, associate director of the Bloomberg-Kimmel Institute for Cancer Immunotherapy, and director of the Convergence Institute. Jaffee is a cancer immunology pioneer, developing immune therapies for pancreatic cancer and identifying immune cell signals that play a role in pancreatic cancer development and progression. She developed the science and technology for therapeutic cancer vaccines to treat pancreatic cancer, including a GMP facility to manufacture the vaccines. She holds six patents for the vaccines, and she and young investigators she is training continue to develop better versions. Jaffee is past president of the American Association for Cancer Research, a member of the National Cancer Advisory Board, chair of President Biden's Cancer Panel and a co-chair of the Biden Moonshot Blue Ribbon Panel. She was the 2023 recipient of the Distinguished Mentoring Award and the 2024 recipient of the Society for Immunotherapy of Cancer Richard V. Smalley Memorial Award.



KARP

Judy Karp came to the Cancer Center in 1973 as a one of the first three fellows; David Ettinger, and Skip Trump, were the other two. She is one of the world's leading experts on leukemia and complications related to infections resulting from leukemia and developed clinical trials aimed at preventing infections. Karp and colleague Phillip Burke directed the Center's leukemia program. They developed timed sequential therapy for leukemia, employing short courses of high-dose anticancer drugs specifically timed to be given when cancer cells were reproducing and more sensitive to drug therapy. Their treatment resulted in long-term remissions of 70% in patients treated.

Suzanne Topalian is associate director of the Bloomberg-Kimmel Institute for Cancer Immunotherapy and a Bloomberg-Kimmel Professor of Cancer Immunotherapy. She joined the Kimmel Cancer faculty in 2006 as director of the melanoma program. Her studies of anti-tumor immunity have provided a foundation for the translational development of cancer vaccines, adoptive T cell transfer and immune modulating monoclonal antibodies. Her current research focuses on manipulating immune checkpoints, such as PD-1, which she helped reveal cancer cells use to shut down the immune response to tumors. The discoveries have cemented immunotherapy as a mode of cancer treatment and transformed the care and survival of people with melanoma skin cancer and lung cancer. She is focused on identifying biomarkers that can predict clinical outcomes. She was named one of Nature's 10 in 2014, and received the Karnofsky Award from the American Society of Clinical Oncology in 2015.



TOPALIAN

Marikki Laiho is the Willard and Lillian Hackerman Professor of Radiation Oncology, director of molecular radiation sciences, and co-director of the Kimmel Cancer Center's Cancer Chemical and Structural Biology Program. Laiho's research is aimed at better understanding the mechanisms cancer cells use to survive radiation therapies and developing ways to prevent them from sensing and repairing the damage. She studies a cellular machinery, called POL1, that cancer needs to survive. In her laboratory studies using human cells, new drugs, called small molecule inhibitors, break down this critical activity. She plans to study them in clinical trials.



LAIHO

Constance Griffin directed the Kimmel Cancer Center's Cancer Risk Assessment Program. Her research was focused on gene alterations in solid tumors and hematologic cancers. Her research of the ALK gene and its role in inflammatory responses helped provide proof that the inflammatory process was linked to cancer initiation. She was particularly interested in better understanding the inherited basis of cancer among families. She died in 2012.



GRIFFIN

Martha Zeiger gained international prominence at Johns Hopkins as a leader in endocrine surgery and thyroid cancer research, where she led a molecular biology laboratory for two decades. She served as president of the American Association of Endocrine Surgeons. Currently, she is professor and chair of the Department of Surgery at the University of Virginia. Zeiger also served six years in the United States Navy as a general medical officer, commander and surgeon.



ZEIGER



WEBER

Kristy Weber joined the Kimmel Cancer Center in 2003 as chief of the Division of Orthopaedic Oncology and director of the sarcoma program. She built a clinical practice and basic science program in sarcoma, studying the molecular mechanisms associated with cancers of the bone. She and her colleagues developed human bone metastasis-derived cell lines and novel targeted therapy strategies for cancers that spread to the bone. In 2006, she received the Kappa Delta National Orthopaedic Research Award for this work. She left the Kimmel Cancer Center to become director of the sarcoma program at the Abramson Cancer Center at Penn Medicine. She was the first woman president of the American Academy of Orthopaedic Surgeons. She also served as president of the Musculoskeletal Tumor Society and was the inaugural founder and first president of the International Orthopaedic Diversity Alliance, which champions diversity, equity and inclusion in orthopaedics worldwide.



CANTO

Marcia Canto came to Johns Hopkins in 1996 as the first woman director of therapeutic endoscopy and endoscopic ultrasonography, quickly achieving international recognition as an academic endoscopist in a male-dominated subspecialty. She is the international authority on Barrett's esophagus, a risk factor for esophageal cancer, and early detection of pancreatic cancer in high-risk individuals.



ELISSEFF

Jennifer Elisseff is a biomedical engineer and director of the immunoengineering program at the Bloomberg-Kimmel Institute for Cancer Immunotherapy. She develops smart materials for the repair and regeneration of tissues. She is investigating her biomaterials in research models as a way to slow the growth of cancer cells. Laboratory studies suggest that these biomaterials may also be able to find and kill cancer cells that have spread from the primary tumor to other parts of the body. Elisseff is a member of the National Academy of Inventors.



IACOBUZIO-DONAHUE

Christine Iacobuzio-Donahue joined the Kimmel Cancer Center in 2003, where she developed a mathematical model that, for the first time, allowed clinicians to quantify the development of pancreatic cancer — the time it takes for a precancerous cell to develop into a cancer. The model revealed an 11- to 18-year window from precancerous lesion to advanced cancer, providing an opportunity to intervene early and potentially cure these cancers with surgery. Her discovery led to the development of technology that rapidly picks out proteins and other biomarkers to help predict and detect pancreatic cancer.



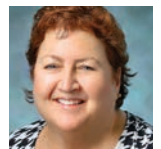
STEARNS

Vered Stearns joined the Kimmel Cancer Center in 2002 and was named co-director of the breast cancer program in 2010 and awarded the breast cancer research chair in oncology. She was instrumental in building the multidisciplinary translational team that supported innovative clinical trials. She worked with the Consortium on Breast Cancer Pharmacogenomics, evaluating the predictive role genetic variants play in the safety and efficacy of endocrine therapies. She also advanced research of liquid biopsy — the detection of circulating cancer cell DNA in blood — to help detect breast cancer and guide treatment. In 2023, she was recruited to Cornell University as its director of transitional breast cancer and associate director for clinical affairs at the Meyer Cancer Center, but she remains an adjunct professor at the Kimmel Cancer Center.



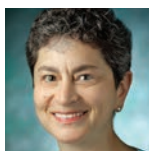
SLUSHER

Barbara Slusher is director of Johns Hopkins Drug Discovery and a member of the Bloomberg-Kimmel Institute for Cancer Immunotherapy. She leads the largest integrated drug discovery program at Johns Hopkins, translating basic science discoveries into novel therapies. She co-developed a cancer drug called DON, with Jonathan Powell, that targets cancer cell metabolism, cutting it off from the nutrients it needs to survive, diverting the nutrients instead to immune cells, which can attack cancer cells. She led the first-ever international consortium of over 130 Academic Drug Discovery Centers to coordinate and enhance university-led drug discovery efforts.



ARMSTRONG

Deborah Armstrong is director of the Breast and Ovarian Surveillance Center. She joined the Kimmel Cancer Center in 1993, where she developed a large clinical practice exploring new therapies for breast, ovarian and other gynecologic cancers. She is a national leader in investigational cancer therapeutics, including the revival of a half-century-old method for delivering chemotherapy directly into the abdomen. Her research resulted in renewed interest in the abandoned method, called intraperitoneal chemotherapy. She chaired the Oncology Drugs Advisory Committee for the FDA, received the Ladies Home Journal Breakthrough Achievement Award, the Rosalind Franklin Award for Excellence in Ovarian Cancer Research, the Kimmel Cancer Center's Director's Teaching Award in Clinical Science and was two-time recipient of the Johns Hopkins Osler Housestaff Teaching Award.



SOKOLL

Lori Sokoll a faculty member since 1997, studies ways to improve the clinical use of PSA (prostate specific antigen) tests. She is focused on the measurement, evaluation and clinical applications of cancer biomarkers, with a specific emphasis on tumor markers for prostate cancer.



AHUJA

Nita Ahuja came to the Cancer Center in 2003 as the Jacob C. Handelsman Professor of Abdominal Surgery. She discovered that abnormal methylation occurred early in colorectal cancers, and led multiple national clinical trials using epigenetic therapies for solid tumors. In 2018, she was recruited to Yale University as the chair of the Department of Surgery.



TRIMBLE

Connie Trimble is director of the Center for Cervical Dysplasia and built a clinical and basic research program in immune therapies for HPV, with the goal of eradicating disease and preventing cervical cancer without the need for surgery. She established a Cervix Center for women with abnormal Pap tests, and treats more than 1,000 women annually.



SMITH-RESAR

Linda Smith-Resar trained in hematology/oncology, where she became fascinated by the molecular underpinnings of cancer. She was recruited to Johns Hopkins and the Kimmel Cancer Center faculty, and established a basic science laboratory for her pioneering studies on High Mobility Group A1 (HMGA1) proteins in cancer. Her laboratory engineered the first animal model demonstrating that the abnormal expression of HMGA1 causes leukemia. She received Research Scholar Awards from the American Cancer Society and Leukemia & Lymphoma Society, and was awarded the David M. Levine Excellence in Mentoring Award in 2015.



WANG

Tian-Li Wang is director of the Molecular Genetics Laboratory of Female Reproductive Cancer and a member of the Kimmel Cancer Center's Breast Cancer and Women's Malignancies Program.



COX

Andrea Cox is an internationally recognized leader in the studies of immune responses to chronic viral infections, including HIV, hepatitis B and hepatitis C. She was principal investigator on the first prophylactic HCV vaccine trial in high-risk individuals. HCV is a risk factor of liver cancer. Cox is also a faculty adviser for the Association of Women Student M.D.-Ph.Ds.

Christine Gourin treats patients with thyroid cancer and other head and neck cancers. Her research interests focus on quality of life, functional outcomes and survival following treatment for head and neck cancer.



GOURIN

Lillie Shockney, University Distinguished Professor of Breast Cancer, has worked at Johns Hopkins since 1983. She is certified as a breast imaging and breast cancer patient navigator. In 2011, she accepted the inaugural role as director of the Kimmel Cancer Center's survivorship programs. In 2012, she was named program director of the Academy of Oncology Nurse Navigators. Shockney, a cancer survivor, joined forces in 2012 with Kimmel Cancer Center Chief Administrative Officer Terry Langbaum, also a cancer survivor, to launch Work Stride to help people in the workplace diagnosed with cancer. Today, the program reaches more than 300,000 employees and their families across the country. Langbaum died in 2019.



SHOCKNEY

Allison Klein directs the National Familial Pancreas Tumor Registry and created a tool, called PancPRO, that computes an individual's lifetime risk of developing pancreatic cancer. She joined the pancreatic cancer research team in 2004. In collaboration with Scott Kern, Michael Goggins and Ralph Hruban, she is deciphering the genetic determinants of pancreatic cancer. Klein is also leading a study of 2,000 African Americans, who are 20% more likely to develop pancreatic cancer, to look for genetic differences among 1,000 patients with pancreatic cancer and 1,000 healthy participants to help decipher this cancer disparity.



KLEIN

Claire Snyder is focused on quality of cancer care with an emphasis on quality of life for people with cancer and coordination of cancer care between cancer specialists and primary care providers. Among her interventions are patient questionnaires that help clinicians identify and address quality of life issues. She developed the PatientViewpoint webtool to link questionnaire responses with patients' electronic medical records. Snyder has conducted multiple studies using large databases to examine quality of care for cancer survivors, including preventive and primary care, underlying health conditions and cancer follow-up.



SNYDER



ARMANIOS

Mary Armanios studies telomere dysfunction and is director of the Telomere Center, which is at the forefront of individualized care for patients and families affected by telomere disorders. Telomeres are protective endcaps on chromosomes. Armanios defines approaches to surveillance, diagnosis and treatment of telomere-related diseases, including cancer, bone marrow failure/aplastic anemia, idiopathic pulmonary fibrosis and liver cirrhosis. Armanios is also associate director of cancer research career enhancement.



BRAHMER

Julie Brahmer is co-director of the Cancer Immunology Program and director of the Thoracic Oncology Program. She led clinical trials of gene-targeted drug therapies and immunotherapy for lung cancer and mesothelioma, including practice-changing trials of anti-PD-1 therapies. Brahmer is co-principal investigator on the Johns Hopkins Clinical Trials Network. She is one of the founding board members for the National Lung Cancer Partnership and is on the medical advisory board of the Lung Cancer Research Fund and the Mesothelioma Applied Research Foundation.



VISWANATHAN

Akila Viswanathan is director of the Department of Radiation Oncology and Molecular Radiation Sciences. She is a leading expert in the use of image-guided brachytherapy for gynecologic cancers, and was the first in the U.S. to use real-time magnetic resonance-guided interstitial brachytherapy for the treatment of gynecologic cancers.



BLAKELY

Jaishiri Blakely is the Marjorie Bloomberg Tiven Professor of Neurofibromatosis in Neurology, Oncology and Neurosurgery. Her clinical research is focused on the development of clinical trials for nervous system tumors.



SHARMA

Dipali Sharma focuses her research on the molecular links between obesity and breast cancer. She discovered a molecule produced by fat cells, called leptin, that canceled out the drug tamoxifen's ability to prevent breast cancer in laboratory studies. She is also studying a natural compound derived from magnolia trees, called honokiol, known to have cancer-protective properties. Sharma was named the 2023 Fetting Fund for Breast Cancer Prevention Scholar.



LOTAN

Tamara Lotan is a genitourinary cancer expert. Her research described a novel mechanism of tumor formation in kidney cancers driven by over-expression of one gene, the mechanistic target of rapamycin complex 1 (mTORC1) signaling pathway, and loss of expression of another gene, the tuberous sclerosis complex (TSC) tumor suppressor gene. The findings point to potential therapeutic targets for some of the most aggressive renal cell cancers. She is also a researcher on the RESPOND study, the first large-scale, multi-institutional study of African American men with prostate cancer to better understand why they are at higher risk for developing more aggressive forms of the disease and are more likely to die from it. The study will be the first in any racial group to fully integrate genetic alterations with gene expression data, social determinants of health and markers of tumor aggression.



WEERARATNA

Ashani Weeraratna is a Bloomberg Distinguished Professor and the E.V. McCollum Professor and Chair of Biochemistry and Molecular Biology at the Bloomberg School of Public Health. She is also co-director of the Kimmel Cancer Center Cancer Invasion and Metastasis Program. She is among the first to study and uncover age-related differences in how people respond to cancer therapy. The research earned her recognition by the National Cancer Institute during its commemoration of the National Cancer Act 50th anniversary. Weeraratna researches melanoma skin cancer, and has led public health initiatives to install sunblock dispensers in public spaces and to educate children about the dangers of sun exposure. She is also an advocate for the contributions of immigrant scientists and is a mentor for junior faculty members, women and people of color in science. In 2021, she was among seven scientists appointed to the National Cancer Advisory Board.



TAUBE

Janis Taube is director of the Division of Dermatopathology, co-director of the Tumor Microenvironment Laboratory at the Bloomberg-Kimmel Institute for Cancer Immunotherapy, and co-director of the Mark Foundation for Advanced Genomics and Imaging. Her research is focused on identifying biomarkers that predict response to immunotherapy. She and collaborator Alexander Szalay developed AstroPath, a comprehensive platform for imaging and mapping microscopic sections of tumors to guide precision immunotherapies for cancer.



LENNON

Anne Marie Lennon is director of the Multidisciplinary Pancreatic Cyst Clinic. She specializes in the management of patients with pancreatic cysts and precancerous lesions. Collaborating with the Kimmel Cancer Center Ludwig Center laboratory, directed by Bert Vogelstein and Kenneth Kinzler, she helped develop a test called CompCyst, a laboratory test that uses artificial intelligence tools and has the potential to more accurately sort out which people with pancreatic cysts will go on to develop pancreatic cancers. Only a small fraction of cysts progress to cancer. The ability to distinguish benign cysts from cancerous cysts would allow clinicians to identify patients who will not require follow-up and those who will need long-term follow-up or immediate surgical resection.



RUDEK

Michelle Rudek directed the Kimmel Cancer Center's Analytical Pharmacology Shared Resource, leading a team that conducts tests to see how promising new drugs travel through the body, are absorbed, distributed and metabolized, and what effect they have on cancer cells. Collaborating with Michael Carducci, they test drugs being used in the National Cancer Institute (NCI) Experimental Clinical Trials Network and support the NCI's Adult Brain Tumor Consortium and AIDS Malignancy Consortium. Rudek also researched and managed drug interactions among people with cancer who have underlying health conditions, such as liver or other organ dysfunction, to ensure they can safely receive anticancer drugs. She was the first nonphysician recipient of the NCI's Michael Christian Oncology Development and Lectureship Award. She passed away in 2023.



FAKHRY

Carole Fakhry is the Charles W. Cummings, M.D., Professor of Otolaryngology and Director of the Head and Neck Cancer Center. She was recently appointed the associate dean for clinical affairs. She will work collaboratively to help develop and implement strategies for the Clinical Practice Association to help ensure patient-centered, safe and efficient care delivery. Fakhry is an internationally recognized expert in head and neck cancer, and her research has been pivotal to advancing the understanding of these cancers and helped define a distinct type of head and neck cancer, with the human papillomavirus (HPV) as a biomarker, in the National Comprehensive Cancer Network guidelines. She also oversaw the development, implementation and growth of the clinical trials infrastructure and portfolio in collaboration with the Bloomberg-Kimmel Institute for Cancer Immunotherapy.

Nilofer Azad is director of the Cancer Genetics and Epigenetics Program and the Colorectal Cancer Research Center of Excellence. Her research is aimed at developing new drug combinations for patients with advanced cancer. She leads clinical trials to explore how epigenetic therapies target chemical alterations to genes that promote cancer development and growth. She is the principal investigator for Johns Hopkins on the Stand Up to Cancer Colorectal Cancer Dream Team and a member of the Epigenetics Dream Team, leading the GI cancer initiatives. She is a member of the National Cancer Institute Colon Cancer Task Force and its Molecular Analysis for Therapy Choice (MATCH) Agents and Genes Working Group, the largest trial of precision, or individualized, medicine in the country. Recently, she was appointed to the National Cancer Advisory Board.



AZAD

Louise Grochow was a graduate of the Johns Hopkins University School of Medicine and one of the Cancer Center's first medical oncologists. She helped launch its drug discovery program and pioneered advances against solid tumors, particularly colorectal cancer.



GROCHOW

Dung Le is the Bloomberg-Kimmel Professor of Cancer Immunotherapy. She led the clinical trials that established a genetic defect called mismatch repair deficiency/microsatellite instability as a predictor of response to immunotherapy with drugs that block the PD-1 immune checkpoint. The findings led to a historic 2017 FDA approval of the immunotherapy drug pembrolizumab across all cancer types for any cancer that contains the mismatch repair deficiency/microsatellite instability genetic defect. Le, who is a gastrointestinal cancer expert, also developed a low-dose, five-drug combination that has proven effective against pancreatic cancer.



LE



PLATZ

Elizabeth Platz is co-director of the Cancer Prevention and Control Program and is the Martin D. Abeloff Scholar in Cancer Prevention. A major focus of her research is the use of molecular and genetic epidemiology approaches to understand the mechanisms underlying prostate incidence and progression. She conducts her work with an eye toward translation of findings into prevention and treatment strategies. She is at the forefront of population research on the role of inflammation, a target for prevention, in the development of prostate cancer, and on telomere length as a prognostic marker for poor outcomes after treatment for prostate cancer. She is a fellow of the American Association for the Advancement of Science, was appointed to the Maryland State Council on Cancer Control and is a steering committee member and former chair of the Maryland Cancer Collaborative.



SCHWARTZ

Cindy Schwartz was a Kimmel Cancer Center pediatric oncologist with a particular interest in survivorship. She contacted nearly 1,000 former pediatric patients successfully treated at the Kimmel Cancer to learn about their experiences with side effects of cancer therapy, such as infertility and organ damage. The information she accumulated was used to create a large statistical database to help predict and manage late effects of cancer therapy. Currently, she is medical director of hematology/oncology at the Medical College of Wisconsin.

Nancy Shaper researched glycoconjugates, a major class of molecules located on the cell surface, and how they interacted with proteins. Her work was foundational to the basic understanding of molecular genetics and the quest for gene alterations associated with cancer development.

Heather Symons is clinical director of the Pediatric Oncology Blood and Marrow Transplant Program. With Kimmel Cancer Center-pioneered science that made haploidentical, or half-matched, bone marrow transplants safe and effective, Symons began performing about 50 per year in pediatric patients. The procedure became so safe, about one-third of the transplants were in pediatric patients with noncancer immune and genetic disorders. Symons is also pairing donor lymphocytes (white blood cells that activate the body's immune system) with chemotherapy to determine if this combination will "awaken" patients' immune systems to the danger of existing cancer cells and, in turn, elicit an immune response.

Kala Visvanathan is director of the Clinical Cancer Genetics and Prevention Service and is the inaugural Fetting Fund for Breast Cancer Prevention Scholar. She is an expert in breast cancer prevention in diverse populations. Her research includes predicting the risk of invasive cancer among women with atypical hyperplasia, evaluation of screening in high-risk women, and studying benefits of tamoxifen in individuals who are overweight or obese. There is a panel of genes experts look for in breast cancer to tailor early detection and preventive care, and Visvanathan is developing short, patient-driven, culturally sensitive videos to help patients and families understand the importance of genetic testing.

Eva Zinreich was one of the Kimmel Cancer Center's first radiation oncologists and helped build the program.



SYMONS



VISVANATHAN



ZINREICH



Kimmel in the Community

The Cancer Center's outreach to the community has always existed, but it has changed and expanded over its 50-year history.

COMMUNITY OUTREACH was initiated in 1978 to make sure advances against cancer made at Johns Hopkins were available to patients throughout Maryland, across the U.S. and around the world.

David Ettinger, one of the Cancer Center's first fellows and faculty members, spearheaded the initial efforts to engage cancer experts in the community. It began informally.

It was not unusual for Ettinger to field multiple calls in a day to help physicians in Maryland and other states who were treating patients with cancer. There was a constant barrage of faxes and phone calls, such as a physician in New Jersey treating a patient with lung cancer calling to discuss the latest treatment options. Another from Western Maryland wanted to know the best possible use of

a cancer-fighting drug. Someone else had a question concerning the current guidelines of the National Comprehensive Cancer Network for small cell lung cancer. Ettinger made time for all of them.

Telephone and face-to-face communication were the only tools for outreach.

"When I joined the oncology team in 1975, there were no fax machines and no computers," says Ettinger.

He began hosting monthly meetings open to all cancer specialists in the community to come to Johns Hopkins and hear about research advances and to discuss challenging cases.

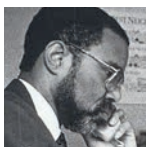
Today, in the era of computers and smartphones, most are familiar with the term virtual medicine, but decades before these technologies were available, Ettinger and others had already begun to envision them.



ETTINGER

In 1989, collaborative radiation oncology services were established among the Cancer Center and St. Agnes Hospital in Baltimore and Chambersburg Hospital in Pennsylvania. In the late 1990s, with the advent of computers, Ettinger and other experts began to use sophisticated computer connections to review patient X-rays and CAT scans from as far away as Singapore. Ettinger called it telemedicine.

At the same time, we began to see that working with community physicians was not enough. There were many people, particularly those who did not have health insurance, those living in poverty and racial minorities, who were suffering in silence. They were not seeking help for health issues.



WILSON

We began in our own neighborhood. Reverend **Doug Wilson**, director of community outreach, worked with local clergy to bring cancer screening and detection programs to the communities of East Baltimore.

In 1999, Cancer Center social worker **James Zabora** took over as director of community outreach.



ZABORA

“I looked out of my office window directly into the neighborhoods with possibly the highest cancer rates in the nation. I realized, as a comprehensive cancer center, we had an obligation to apply our knowledge to help these communities,” said Zabora.

In the late 1980s, an analysis of health disparities based on ZIP codes confirmed what Zabora already suspected. The life expectancy for a resident of low-income neighborhoods along Madison/East End was 64, compared with 84 for residents of the higher-income neighborhood of Roland Park, even though the communities were only 5 miles apart.

He began working with churches, community centers and local organizations to provide education about cancer screening.

In 2002, with the establishment of the Maryland Cigarette Restitution Fund (CRF, see page 106), Zabora’s efforts were aided by a \$1.5 million public health grant to expand outreach, with a particular focus on Maryland’s most common cancers.

Zabora and team took on Baltimore City’s prostate cancer death rates — the highest in the nation — providing physical exams and PSA (prostate specific antigen) tests to 2,500 African American men. The grant meant that, if a cancer was detected, treatment at the Kimmel Cancer Center could be provided at no cost.

Building upon Reverend Wilson’s earlier outreach, Zabora continued partnering with ministers and community activists. Cancer screening sites opened at the Bea Gaddy Center, Garden of Prayer Baptist Church, Morgan State University and the Korean Resource Center, and thousands were being reached.

Jean Ford joined the Kimmel Cancer Center in 2006 as director of community programs and cancer health disparities research. He was focused on understanding the barriers to care and increasing participation in cancer prevention and treatment trials.



FORD

Under his leadership, the East Baltimore Medical Center was set up as the headquarters for the program. “We wanted our staff to be located right in the community,” said Ford.

Connie Ziegfeld, former assistant director of nursing for the Kimmel Cancer Center, was now worked with Ford as a clinical nurse specialist and case manager for the CRF-supported prostate cancer screening program.

Ziegfeld quipped that she didn’t know whether to say she was a public health nurse, patient advocate, travel agent, counselor or health educator. Community members said she was all that and more.

Years of working as an oncology and ambulatory care nurse allowed her to efficiently navigate the potentially restrictive factors that can block patients’ participation in their own health care.

“I’m doing something for a population that is frequently overlooked in our society,” she said. “It touches me positively every day.”

In 2010, the Kimmel Cancer Center established the Johns Hopkins Center to Reduce Cancer Disparities with the goal of providing all Maryland communities equal access to cancer prevention and treatment services.

One project, led by **Theron Scott**, assistant director of community education, focused on smoking cessation. Scott, an African American and former two-pack-a-day smoker, took a smoking cessation program to Latrobe Homes, an East Baltimore public housing development near Johns Hopkins. The program was so successful, it quickly expanded to other low-income neighborhoods



SCOTT

There was success. All of the efforts were making an impact. Overall, cancer death rates declined in our state, and the gap in cancer death disparities between African American and white Marylanders narrowed by more than 60% since 2001, far exceeding national progress. Like **Albert Owens** and **Martin Abeloff** before him, Kimmel Cancer Center Director **William Nelson** was committed to eliminating the gap.

Enter **Dina Lansey**, Nelson’s choice to direct efforts to increase minority participation in clinical trials. Lansey, a seasoned expert in addressing racial disparities in cancer, developed ways to better measure and understand why many African Americans, women, elderly people with low income, and Baltimore City residents often chose not to participate in clinical trials.



LANSEY

Lansley began gathering data and identified cost and convenience of transportation as one barrier, launching a pilot project to provide free parking or taxi transportation to Baltimore City residents.

She also launched a clinical trials awareness campaign, including in-depth videos that explained clinical trials and offered patient testimonials, to help patients and families better understand the purpose of clinical trials and the value of considering them when making treatment decisions. She also instituted mandatory training for all clinical faculty and staff.

Under her leadership, Johns Hopkins became the first institution to use its electronic medical records to support conversations about clinical trials. Lansley matched minority and low-income patients to available clinical trials, and used a database to track reasons patients declined to participate. She used the information to help guide the development of ways to remove fixable barriers that kept patients from treatments that could help them. The system also documented that clinical trials were discussed with patients, and communicated names of interested patients to study teams.

Her action plan included collaborating with investigators as studies were designed to identify barriers to participation from the onset and develop targeted interventions aimed at those most in need.

Lansley's efforts had promising results. As the number of patients from Maryland treated at the Kimmel Cancer Center increased, the disparities gap continued to narrow.

In 2019, the program again expanded with the recruitment of **Otis Brawley**, a nationally renowned authority on cancer screening and prevention, as director of community outreach and engagement. Brawley, a Bloomberg Distinguished Professor, had been chief medical and scientific officer for the American Cancer Society and director of the Georgia Cancer Center at Grady Memorial Hospital in Atlanta.

Together, Lansley and Brawley have taken the program to a new level, establishing a Community Advisory Board and recruiting clinical health educators.

In 2022, they launched a community health education program, with the clinical health educators providing live webinars and in-person sessions to educate communities about healthy living, ways to reduce cancer risk and cancer screenings. The program was launched with a series of sessions offered to the more than 900,000 Johns Hopkins Community Physicians patients through its network of community practices throughout Maryland and Washington, D.C.



BRAWLEY

Between March 2022 and January 2023, they hosted 10 events and reached more than 1,600 citizens with presentations on colorectal and breast cancer awareness, cancer risk reduction, HPV awareness, cancer and nutrition, and the dangers of vaping. Upcoming sessions on nutrition and exercise are planned.

They seek answers to some very important questions: How do race, income and ZIP code influence life and death? Brawley notes that ZIP code may be more important than genetic code in predicting health outcomes.

Our experts continue to identify pockets of cancer health disparities and work to develop effective interventions. In addition to Baltimore City, some of Maryland's rural areas are highest in cancer deaths and new cases, which we are addressing. With the Kimmel Cancer Center's expansion to the National Capital Region at Johns Hopkins' Sibley Memorial Hospital, additional outreach to Wards 5, 7 and 8 in Washington, D.C., which has some of the highest cancer rates in the country, has started.

Building upon efforts that began in 2003 to establish a collaboration between the Kimmel Cancer Center and Howard University Cancer Center in Washington, D.C., to address cancer burden in minority populations, new efforts have begun to ensure that the diversity of care providers reflects the diversity of people with cancer.

Fabian Johnston and **Mary Armanios**, co-directors of the Center's Diversity, Equity and Inclusion in Education and Training, organized efforts, including social justice dialogue, programs and outreach to historically Black colleges and universities in Maryland, to enhance recruitment, mentorship and retention of underrepresented trainees and faculty members at Johns Hopkins.

Today, Community Outreach and Engagement has grown to embrace a full scope of outreach, from our community and patients to future scientists and clinicians, and it has become interconnected with every research program and clinical activity at the Kimmel Cancer Center.



JOHNSTON



ARMANIOS

DIVERSITY AND DISPARITIES | ADVANCES

NATIONAL REPORT ON CANCER DISPARITIES

In 2022, the American Association for Cancer Research released its inaugural Cancer Disparities Progress Report, described as a collective effort of a number of the world's foremost thought leaders in cancer health disparities research. **William Nelson**, director of the Kimmel Cancer Center, contributed to this first-of-its-kind report as a member of the steering committee, and faculty member **Jelani Zarif**, the Robert E. Meyerhoff Professor, also contributed. The report was presented to the U.S. Congress in a virtual ceremony. *"Many cancer disparity gaps have persisted for decades. We hope this report will serve as a guide for how research questions can help address and close these gaps,"* said Zarif.

HELPING MARYLANDERS QUIT SMOKING

Tobacco use is the leading cause of preventable death, and it disproportionately affects marginalized and underserved communities, so Johns Hopkins Tobacco Treatment Clinic Director **Panagis Galiatsatos** took his clinics on the road to public housing communities throughout Baltimore. He combines medicine and counseling to help people quit smoking and offers lung cancer screening, when indicated. School-based tobacco education curriculums, which also cover e-cigarettes, were launched in Baltimore City and Baltimore, St. Mary's and Calvert counties.

A link between mental health and smoking was also presented to the Maryland Cancer Collaborative's Tobacco Committee. Current smokers were almost twice as likely as nonsmokers to report depression and 63% more likely to report two or more weeks of poor mental health in a month. Galiatsatos reports that people often smoke to alleviate anxiety, depression and isolation, and that relapse among those who have quit occurs when personal struggles arise. To address this, our tobacco treatment clinics provide mental health support and help with coping mechanisms.

PROGRAM ADDRESSES HEALTH INEQUITY AS A DRIVER OF PROSTATE CANCER DISPARITIES

A \$5 million commitment from the Fredrick D. and Karen G. Schaufeld Family Foundation, launched in 2021, the Schaufeld Program for Prostate Cancer in Black Men aimed at reducing the impact of the disease among African American men, particularly in the Baltimore and Washington, D.C., areas.

"We fashioned and imagined a program that would be community-facing and serving, scientifically based, and focused on promoting education, all integrated around the clinical work we do in Baltimore City and in the National Capital Region," says **Mohamad Allaf**, director of the Schaufeld Program. "It's a targeted approach to partner with the community to close a gap in outcomes in a disease that afflicts 1 in 8 Americans."

Prostate cancer is about twice as common among Black men as other populations, and 2.5 times more lethal. Access to care plays a major role in the heightened mortality rate, the program's chief adviser, **Otis Brawley**, says. "If they are treated at a major American facility, once we look at stage, race doesn't matter. Yes, Black men are more likely to get the disease," he explains, "but in the United States as a whole, Black men who are stage 2 have an increased risk of dying from prostate cancer when compared with white men who are stage 2."

Potential biological differences may also play a role in the disparity, says **Tamara Lotan**, the program's co-director. Her lab studies molecular biomarkers – genetic changes that happen in the prostate tumor. "We're trying to better understand the contribution of both of those components."

The Schaufeld Program will also partner with departments across Johns Hopkins to bolster the next generation of physicians and scientists.

The program's community partnership will give providers the opportunity to determine how to best deliver complex information.

"Our goal is that – regardless of race, socioeconomic status or geography or where they live – all men have the information they need so they feel empowered to make an informed decision about their own care," says **Dina Lansey**, the program's senior adviser, "whether that is prostate screening or choosing the best cancer treatment option for them."

UNITY, MORE THAN A CLINIC

A unique collaboration with Unity Health Care to bring cancer screenings, evaluation and navigation to underserved communities in Washington, D.C., got much-needed support from Judy and Peter Kovler, longtime philanthropists to Johns Hopkins. This new clinical program supplements Johns Hopkins' supported programming underway for the communities of Wards 5, 7 and 8 in Washington, D.C., which has some of the highest cancer rates in the country.

Based at Unity Parkside Health Center in Ward 7, a nurse practitioner and navigation professionals from Sibley have been working in Wards 7 and 8 to evaluate patients for cancer. Patients and families who need to access the Kimmel Cancer Center at Sibley Memorial Hospital may receive novel precision navigation funded through the Kovlers' unique investment. Additionally, the Alexander and Margaret Stewart Trust have provided funding to build onto this programming to include a new dimension of peer support.

The Kovlers were inspired to get involved to ensure that everyone has equal access to excellent health care. As active members of the Sibley Memorial Hospital Foundation Board of Trustees and the Kimmel Cancer Center National Advisory Board, the Kovlers joined with Cancer Center leadership to make outreach to underserved communities a priority.

They noted the recruitment by Kimmel Cancer Center Director **William Nelson** of **Otis Brawley** to lead community outreach and engagement for the Kimmel Cancer Center, and **Ashwani Rajput** to direct the Kimmel Cancer Center in the National Capital Region.

“We were impressed with Dr. Nelson’s leadership in bringing Dr. Brawley, the world’s most distinguished figure in medicine, particularly in understanding the needs of minority communities, and Dr. Rajput’s ideas for elevating care throughout the city. It was the perfect team at the perfect time – a great combination of good ideas and talented people,” said Peter Kovler.

CULTURALLY INFORMED PATIENT NAVIGATION

Fabian Johnston, assistant director for diversity, equity and inclusion in education and training at the Kimmel Cancer Center, developed a culturally tailored navigation program for African American patients with advanced solid tumors aimed at advancing care planning, pain management and hospice referral.

CONTROLLING COLON CANCER

African Americans die disproportionately from colon cancer, and **Norma Kanarek**, identified a higher death rate among African American men living along the I-95 corridor from Prince Georges County to Baltimore. Collaborating with Kimmel Cancer Center Community Outreach and Engagement Director **Otis Brawley**, Bloomberg Distinguished Professor, the Maryland Department of Health Center for Cancer Prevention and Control, and Radio One, they initiated the DontDelay.Today campaign for colon cancer prevention and early detection among African Americans. The initiative, promoted by Radio One, directly addresses a problem identified in the community and provides information on the importance of colon cancer screening. It connects people to no-cost screening and information on healthy diet, habits and exercise.

DIALOGUE ON RACE IN MEDICINE

The Johns Hopkins Kimmel Cancer Center presented a three-part virtual series addressing access to cancer care, social determinants of health and ethnic composition of cancer physicians. Kimmel Cancer Center Director **William Nelson**, **Akila Viswanathan**, director of radiation oncology and molecular radiation sciences; **Otis Brawley**, director of community outreach and engagement; and **Ashwani Rajput**, medical director of the Kimmel Cancer Center for the National Capital Region, led discussions and an interactive exchange on urgent issues of race in medicine.

DIVERSITY IN RADIATION ONCOLOGY

Curtland Deville, Proton Therapy Center medical director and clinical director of radiation oncology at the Kimmel Cancer Center at Sibley Memorial Hospital, is working to increase racial diversity among radiation oncologists, serving as a mentor and speaking at universities and before student organizations. He also studies how racism and social injustice manifests into health inequities. He is excited about partnering with other doctors in the community and other local institutions, such as United Medical Center, Howard University and Children’s National Hospital.

“These clinical collaborations enhance our impact on patients in the broader National Capital Region and beyond, providing convenient access to unique care and world-class treatments, such as the most advanced radiation therapies and clinical innovations,” says Deville.

CURE FOR CANCER

At an early age, **Jelani Zarif** had an interest in science. He participated in his annual school science fair and wondered how and why many things around us worked. His interest in cancer and cancer research was sparked in high school, when he began working as a certified nursing assistant at a nursing and rehabilitation center in Chicago.

“Some patients recovered from therapies without relapse of disease, and some, unfortunately, did not,” he recalls. *“These experiences inspired me to want to understand cancer and how we can treat cancer better.”*

He is now a CURE K22-funded researcher working within the Cancer Immunology Program to identify ways to circumvent cancer immune evasion and to activate anti-tumor immune responses in advanced cancers.

As a CURE (Continuing Umbrella of Research Experiences) scholar, Zarif is among an elite group of scientists who are from the populations who suffer from cancer disproportionately – the same populations that are traditionally underrepresented in science careers – and are working to produce research that can successfully reduce that burden.

A DAY AT THE MARKET

In 2007, **Barbara Bates-Hopkins**, senior community engagement coordinator, started the Day at the Market program under the auspices of the Center for Urban and Environmental Health. It is held twice a month at Northeast Market in East Baltimore, and brings to the market Johns Hopkins nurses and doctors, other professional staff and students to offer tips on cancer prevention, screening, detection, treatment and healthy living.

The program, which is supported by the Kimmel Cancer Center, the departments of epidemiology and environmental health and engineering, Johns Hopkins Government Affairs, and the Johns Hopkins Institute for Clinical and Translational Research, has been recognized by the Maryland Department of Health and Mental Hygiene and the Maryland Cancer Collaborative, the group that implements the Maryland Cancer Control Plan.

“Clinical Trials Saved My Life — Twice.”



COL. GARY STEELE had faced adversity before. The 77-year-old retired Army colonel is a graduate of the U.S. Military Academy at West Point. As a cadet in 1966, he broke the color barrier, becoming the first African American to play varsity football at West Point.

In 2011, he faced a different battle — prostate cancer. Since his diagnosis, he has made it a mission to inform other African American men about their increased risk of prostate cancer and the importance of screening.

“I didn’t know I was at higher risk, but now I do, and I want to make as many people as possible aware.”

Col. Steele’s two sons are among those he told. They have been screened and are now helping to spread the word.

Despite early diagnosis, robotic surgery to remove his prostate, and radiation therapy, Steele’s prostate cancer returned, and even worse, it had spread. The doctors who had been treating him had

no other options to offer. That’s when Col. Steele turned to the Johns Hopkins Kimmel Cancer Center and prostate cancer expert **Michael Carducci**. It was the first time anyone discussed clinical trials — research studies of promising new treatments.

Since coming to the Kimmel Cancer Center, Steele has participated in two trials. The first therapy didn’t help his prostate cancer, so in 2015, he began the second clinical trial — one that compares standard hormonal therapy to increased doses of hormonal therapy.

Col. Steele says he feels very emotionally connected to his Kimmel Cancer Center team.

“I believe in the people I have met at Johns Hopkins. I trust them, and have faith that they care about me and are trying to do the best for me. They are not doing something that is just about research,” says Steele.

The second treatment worked, and Col. Steele’s prostate-specific antigen level (PSA) steadily declined until it became undetectable, an indicator that the treatment he received during the second clinical trial was working. There has been no sign of prostate cancer since 2014.

“If they learn something from this study that could one day help someone else, that would be wonderful,” he adds.

This ability to think beyond himself in service to others was instilled in him by his parents.

Col. Steele’s father, Frank Steele, enlisted in the U.S. Army in the 1940s, and his first duty station was at West Point, where he served in a regiment composed of Black soldiers, known as the Buffalo Soldiers.

Decades later, Col. Steele and his brother attended West Point as cadets. Col. Steele gained a great appreciation for the value of teamwork on the football field.

“I was just one person. I was the only Black guy on the team, but we were a team,” he said. “It takes more than one to win.”

Col. Steele has since been inducted into the Army Sports Hall of Fame. Military and football taught him about discipline and hope in the face of adversity. It had helped him many times in his life, including during his battle against prostate cancer, and in 2017 he would need to call upon it again, when he learned the cause of the severe back pain he was experiencing was multiple myeloma.

Multiple myeloma is rare cancer of the blood plasma cells that can cause bony lesions that lead to pain and even fractures. It disproportionately affects African Americans.

Despite its rarity, Col. Steele was not unfamiliar with the cancer. A long-time family friend and wife of a fellow West Point cadet had died from multiple myeloma. During her treatment, she participated in a clinical trial that led to a new therapy that is now a standard treatment for the cancer and is helping thousands of patients. Steele is one of them.

It hit home for him as another deeply personal reminder of the value of clinical trials.

He does not know what researchers learned from the prostate clinical trial and how it may be used to help patients. He has two sons. He thinks about the possibility of what the researchers learned one day helping them, and he offers some advice.

“Educate yourself, take care of yourself, think of your family and pay it forward,” he says. “At the end of the day, there is that one saying on your tombstone. There is the date you were born. And there is the date you die, but there is also a dash in between. So, the question is really about what you do with that dash.”

The Convergence Institute Unraveling Cancer Chaos

THE EXPERTISE and information to solve almost any cancer problem — even the most difficult ones, like pancreas cancer — exist at Johns Hopkins.



JAFFEE

Elizabeth Jaffee, the Dana and Albert “Cubby” Broccoli Professor of Oncology and one of the world’s foremost pancreas cancer experts, is leading research and patient care in a new direction.

Jaffee created a Convergence Institute, where doctors, nurses, astronomers, engineers, computer scientists, physicists, bioethicists, biologists, materials scientists, mathematicians and other experts from a variety of fields will work side by side to amass and apply their knowledge to cancer.



LAHERU

Beginning with pancreas cancer, they will solve complicated and vexing problems, build new technologies and consider out-of-the-box, creative new approaches that can only be found through this type of directed collaboration. Together, they will plan and chart new cancer prevention, detection and treatment strategies that intricately apply every bit of knowledge available.



FERTIG

It represents a new tactic, different from the assembly line approach that, although useful, applies consecutive contribution of expertise, implementing one thing at a time and offering separate and distinct components of the whole. Instead, it brings a convergence of expertise — people coming together in synergy to merge their ideas and knowledge into a new whole.

Imagine, for example, Madame Curie, Katherine Johnson, Albert Einstein, Frederick Douglass, Steve Jobs, Leonardo da Vinci, Aristotle, Stephen Hawking and Sally Ride working together, combining their ideas and expertise to solve a problem. This is what Jaffee envisions for cancer.

AMASSING TALENT

Jaffee recognized the immense talent amassed at Johns Hopkins and had the vision to bring it all together to combat cancer, which is among the most complex diseases. While each new discovery advanced the understanding and treatment of the disease, it tended to also reveal new ways the cancer cell corrupted and disarmed natural biological processes that threaten its ability to survive, grow and spread.

“Cancer is a complicated problem, and to solve this problem, we need more than cancer biologists and cancer doctors,” she says.

The answers, she says, lie in the data we are accumulating, but it requires physicists, engineers, computer scientists and others to turn it into meaningful information that can be used against cancer. Real progress will be measured by who is best able to interpret and use these massive amounts of data to help patients.

“Convergence is the only way to assemble the expertise to make use of all of the tools available and to tailor them to cancer discovery and medicine,” Jaffee says. “It will allow us to convert data chaos into data order.”

ALL HANDS ON DECK

Daniel Laheru, co-director of the Skip Viragh Center for Pancreas Cancer Clinical Research and Patient Care, says the Convergence Institute has an all-hands-on-deck philosophy. It is physically located on the seventh floor of the Skip Viragh Outpatient Cancer Building, but in practice, it extends to every specialty — 34 departments from five Johns Hopkins University Schools — and includes experts who do not typically have a seat at the table in the world of medicine.

“Engineers, physicists and other scientists we don’t typically work with, come at a problem from a different perspective. They find clues we don’t see,” says Laheru. For cancer clinicians and scientists who pioneered the multispecialty approach of bringing together all the medical specialists involved in treating pancreas cancer to develop a treatment plan, expanding this approach to include experts from other scientific areas makes sense.

They begin with development workshops. A cancer doctor like Laheru explains the problem to this expansive and diverse group of experts who make up the Convergence Institute. After, there is a thorough, often hours-long discussion of the problems.

“We speak a different technical language in medicine than an engineer or physicist, so we have to make sure we have a common understanding of the problem,” says Jaffee. “Then, working together, we bring our different tools to the problem.” Teams form to develop and study different ideas and approaches and determine which one or ones work best and merit further investigation.

Jaffee wants to make sure they share information rapidly. She says their colleagues from other fields don’t wait a year for a publication to get the word out on their research, as is often the case in medicine. Instead, they put it out on websites right away so they can share their computation methods and get insights from other experts.

Convergence Institute experts have already begun designing their first studies.

“We’re really the only ones doing it clinically,” says Laheru. “We’re ahead of the curve.”

FROM MATH TO MEDICINE

“Every problem — even cancer — can be informed by math,” says **Elana Fertig**, mathematician and computational biologist and co-director of the Convergence Institute. The Convergence Institute is helping her make the math-to-medicine connection.

Fertig, who began her career as a weather forecaster, made the career change to cancer researcher because of cancer’s complexity. In predicting weather, Fertig says the challenges were taking different sources of data and integrating them with computer models to improve forecasts.

Now, she is applying the same strategy to cancer, gathering data, developing computer models to analyze it to predict how a cancer will behave and how it will respond to different types of treatments.

Fertig developed artificial intelligence methods that decipher the complex circuitry and interconnectivity of gene activity that controls cell growth, death and other behaviors in tissue and organ development, and relates this gene activity to what occurs in other tissues and across different species.

“We are bridging experimental models and divides by building a community of people who are cross-disciplinary to engage with the Cancer Center,” says Fertig. “We’re getting at things we haven’t gotten at before and looking at them in a new way, taking principles from other fields to figure out how to overcome failures in treatment.”

Most laboratories start with a pipette to do an experiment. Fertig and collaborators start with data. “We go in the reverse direction. We start with the data that has already been generated, and then we go to the lab to see what we can learn about them,” she says. “Cancer is a puzzle, and we piece it together using different technologies and different areas of expertise that will get us the answers.”

Jaffee believes the Convergence Institute brings the people together and provides the tools needed to fully understand every cancer. As a pancreatic cancer expert, she believes it represents a new era of cancer research.

“I’ve been researching pancreas cancer for 25 years, and I am very optimistic that we are on the verge of turning this very deadly disease into at least a chronic disease patients can live with,” says Jaffee. “It gives me goose bumps knowing that the work we’re doing in the Convergence Institute and all that we’ve learned will save lives.”

ALWAYS FORWARD THINKING

In 1982, **Ray Lenhard**, **Hayden Braine**, and **Rein Saral**, collaborated with the Department of Biomedical Engineering and Applied Physics Laboratory to establish the Oncology Clinical Information System (OCIS), the original data system to support the clinical, educational and patient care goals of the Oncology Center. In 1983, **John Enterline** became Director of Information Systems at the Cancer Center and took over management of OCIS. Lenhard became Vice President for Information Systems for the Johns Hopkins Hospital. Our biostatistics and quantitative sciences visionaries, including **Steven Piantadosi**, **Steven Goodman**, **Gary Rosner**, **Giovanni Parmigiani**, and **Hao Wang** continued this bioinformatics support of clinical research.

COMMONWEALTH FOUNDATION AND TRANSFORMATIONAL CANCER RESEARCH

Commonwealth Foundation for Cancer Research continues to provide transformational philanthropy to support

research in the Center for Personalized Cancer Medicine, including: “theranostics,” radiopharmaceuticals that treat and track cancer; research that revealed circulating tumor DNA as a biomarker of response to immune therapy; innovative therapies using testosterone as drug therapy for prostate cancer; the identification of the FLT3 gene-positive as a subtype of treatment resistant leukemia as well as drugs to target the mutation; the potential of epigenetic therapies to prime cancers to respond to immune therapies; and the development of post bone marrow transplant cyclophosphamide as a new standard of care to prevent severe cases of a common complication known as graft vs host disease.

THE TOOLS OF CONVERGENCE

THE GOOGLE MAPS OF CANCER: New computational approaches are providing a never before seen view – at the single cell level – of the tumor and all of the cells in and around it that contribute to its survival. Similar to Google Maps, the fine details these new technologies provide offer a detailed view of how and where the tumor exists in the body and how it interacts with surrounding tissues. It’s possible to zoom in on spatial features and also pull back to get a fuller view. Pathologist **Bob Anders**, can do the same thing at the cellular level to provide a “Google Map” of an organ and surrounding tissue and organs. Provided with any list of proteins, Anders can quantify their abundance, where they are in the tumor and how they are affecting the growth and spread of a cancer.

FROM ASTRONOMY TO CANCER: The images of the night sky that astronomer and computational scientist **Alexander Szalay’s** datasets created are remarkably similar to the terrain of the cancer cell and its environment. Szalay and his Kimmel Cancer Center collaborator **Janis Taube**, developed AstroPath, a comprehensive platform for high-quality imaging and mapping of microscopic sections of tumors. Taube and Szalay are co-directors of the Mark Foundation Center for Advanced Genomics and Imaging.

These deep-learning algorithms, derived from artificial intelligence, provide sophisticated models that help predict what treatment is the best option for a patient. Jaffee and other cancer experts can use their technologies to determine how likely a cancer is to respond to different types of immunotherapy or other treatments.

SINGLE CELL SEQUENCING: **Luciane Kagohara** uses a specialized technology called single cell sequencing, which offers a detailed view of the tumor composition and enables scientists to measure all cell types in the tumor and examine their function. With the rapid advances in the field, it’s now possible to zoom in on spatial features and identify how those same cells interact with one another without dismantling the tumor samples. This approach can help scientists and clinicians discriminate between treatment resistance built into the tumor and resistance that is acquired during treatment.

ORGANOIDS: Small, natural replicas of human tissue, called organoids, are another example of a new technology used in the Convergence Institute. **Richard Burkhart** and pathologist **Laura Wood** are using pancreas organoids, ultra-tiny replicas of a patient’s pancreas, grown from their own cells, to better understand the mechanisms of how a cancer originates and grows, and as a unique way to test responses to treatments. Wood and Burkhart think the organoids reflect the tendencies of the actual patient tumor. For example, if an organoid grows more quickly, it could be a warning sign that the tumor may be more aggressive and dangerous.



TAUBE



SZALAY



KAGOHARA

The Johns Hopkins Proton Therapy Center Opens



THE JOHNS HOPKINS Proton Therapy Center opened Oct. 1, 2020, giving adult and pediatric patients access to a highly targeted cancer treatment that spares nearby healthy tissues and organs and reduces potential side effects, including the risk of recurrence.

In addition, as an academic proton therapy center, research is performed in a dedicated gantry.

“I am excited to be part of an academic center at the forefront of solving issues and questions about proton therapy,” says **Curtiland Deville**, medical director of the Johns Hopkins Proton Therapy Center. “What are the best indications for proton? Where can we increase benefit, and where can we reduce toxicity? Where are we not getting such benefit and can let go? This is an area that is lacking, and our center will be solving these unknowns and leading future progress.”

Proton therapy is an effective way of killing cancer while minimizing harm to healthy, surrounding tissue. The proton beam releases its energy entering the tumor, and stops at the tumor. There is no exit dose, so the risk of harm to healthy surrounding tissue is reduced.

Unlike traditional radiation, which uses X-rays to destroy cancer cells, proton therapy uses subatomic particles with about 2,000 times more mass, explains **Matthew Ladra**, assistant professor of radiation oncology and molecular radiation sciences and director of pediatric radiation oncology for the Kimmel Cancer Center at Sibley Memorial Hospital.

The new 80,000-square-foot Proton Therapy Center — one of the largest and most advanced in the world — houses state-of-the-art proton therapy equipment, including four treatment gantries equipped with the most advanced technologies. The center’s experts are using this advanced tech-

nology, supported by the latest research, to deliver individualized care.

“These advanced imaging facilities give our expert, disease-focused physicians exceptional ability to use very precise anatomy to plan proton therapy,” says **Akila Viswanathan**, director of the Department of Radiation Oncology and Molecular Radiation Sciences.

A large mechanical arm called a gantry can move the beam 360 degrees around the patient, treating the tumor from several angles, layer by layer, killing cancer cells with the most advanced pencil beam delivery. Our highly trained radiation oncologists and physicists direct the proton beam to the tumor with pinpoint accuracy, and treatment is conformed to the size and shape of the tumor.

It is the only proton center with CT imaging integrated with treatment to ensure accurate and precise treatment planning and treatment delivery. Respiratory gating technology tracks the proton beam to movement of the tumor and stops the beam if the tumor moves. Our experts helped invent and develop both technologies.

The proton therapy center is one of the few in the world — and the only one in the Washington, D.C., region — with a dedicated pediatric team that specializes in caring for young oncology patients.

Viswanathan and **Marikki Laiho**, director of molecular radiation science, are excited about what Kimmel Cancer Center experts can offer to advance the understanding and use of proton therapy.

“Although it has been around for a long time, it is very much in its infancy in terms of exploration and potential,” says Viswanathan. “There are many aspects we are still learning about and many research opportunities,” adds Laiho. “That’s something unique we bring to the table.”



DEVILLE



LADRA

Facing a Pandemic

THE COVID-19 PANDEMIC shook the world, but cancer doctors and researchers — no strangers to difficult challenges — were among the Johns Hopkins experts who led efforts to understand and contain this novel, history-making virus.

Cancer treatments often deplete immune cells, weakening the immune system, so the COVID-19 pandemic placed cancer patients among the most vulnerable to infection. Given the dangers the virus presented to patients, our doctors and nurses sprang into action to keep our patients safe.

It was all hands on deck, and administrative staff members also stepped up, helping to screen patients and visitors for signs of the infection.

Not unlike the early days of our Cancer Center, when doctors, scientists and nurses worked together to develop novel strategies to make progress against a disease that was poorly understood, ideas for how to treat the virus and ways to protect our patients were almost immediate.

Working together, our clinicians created guidelines for treatment to help prevent cancer patients from contracting COVID-19 and to help those infected with the virus safely continue cancer therapy. These guidelines were shared and adapted by other cancer care providers across the nation and the world.

A trained team made tens of thousands of COVID-19 testing kits in a Kimmel Cancer Center lab uniquely outfitted to meet special quality control standards required for manufacturing pharmaceutical products. Research laboratories throughout the Cancer Center donated supplies needed to complete the kits.

Within days of the outbreak, **Gina Szymanski**, incident commander, and **MiKaela Olsen**, clinical nurse specialist and operations chief of the Kimmel Cancer Center's COVID-19 Command Center, opened the Curbside Shot Clinic — a drive-up treatment delivery system — for outpatients and a special urgent care bio clinic for patients with cancer who were infected with the coronavirus.

Patients were able to drive up to the front of the Skip Viragh Outpatient Cancer Building, where they were met by nurses to have their blood drawn and checked and to receive single injections of therapy drugs, cancer vaccines, or growth factors that

stimulate production of blood cells diminished by cancer treatments — every kind of treatment except chemotherapy IV infusions — without ever leaving their cars.

To provide care to patients with cancer who had COVID-19-like symptoms or who were already diagnosed with the virus, the nursing team quickly converted space in the Weinberg Building into an urgent care biocontainment clinic. The clinic — which is available to patients at all of our Kimmel Cancer Center locations — was uniquely set up to care for patients with infectious diseases, keeping them safe and cared for while preventing the spread of the infection to other patients.

Radiation Oncology established special simulation and treatment rooms for adult and pediatric patients at all five of our Kimmel Cancer Center radiation oncology sites. Like the biocontainment clinic, these rooms were set up with unique air flow and filtering to care for patients with infectious diseases.

As a result of this quick action, just 26 Cancer Center patients became infected with the coronavirus — unrelated to their visits to Johns Hopkins — and most importantly, they all recovered.

In addition to caring for our own patients, our doctors and nurses cared for patients transferred from other hospitals and clinics throughout the state that were not set up to care for patients with COVID-19. We worked collaboratively with Maryland elected officials and our colleagues at the University of Maryland to construct a field hospital to address the additional strain the virus placed on Maryland.

On the research side, our researchers proposed an innovative therapy to prevent an inflammatory process called cytokine storm syndrome, which is associated with COVID-19 severity and death. A test of white blood cells was developed to identify individuals in need of early intervention to prevent the acceleration of their COVID-19 disease. Kimmel Cancer Center Director **William Nelson** was appointed to head the Johns Hopkins committee charged with reviewing proposed research and activating the most promising projects.

“History is important, and it taught us that we can treat very sick patients as outpatients,” said Szymanski. “We don’t wing it, and we don’t place artificial limits on ourselves.” She reminds us that what the Kimmel Cancer Center team did to help our patients during COVID-19 is a continuation of what we’ve always done: work on the cutting edge of science and blaze new trails to make rapid progress against threats to health.