

Cancer Awareness, PREVENTION & TREATMENT



THE FIGHT AGAINST CANCER TOUCHES ALL OF US, EITHER PERSONALLY OR THROUGH OUR LOVED ONES.

Cancer is the second leading cause of death globally, accounting for an estimated 9.6 million deaths, or one in six deaths. Lung, prostate, colorectal, stomach and liver cancer are the most common types of cancer in men, while breast, colorectal, lung, cervical and thyroid cancer are the most common among women.

The cancer burden continues to grow globally, exerting tremendous physical, emotional and financial strain on individuals, families, communities and health systems. In the United States, where health systems are strong, survival rates of many types of cancers continue to improve thanks to accessible early detection, quality treatment and survivorship care.

In this special section, we feature a collection of articles provided by some of the leading authorities on the disease. These articles provide personal stories, news of recent statistics, breakthroughs and learnings, and some philosophies on the ever-important issue of screenings, treatments and prevention.

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CANCER AWARENESS

A Young Mother's Battle With Lung Cancer

By ABE ROSENBERG

In April 2020, Jessica Sherrie, a sketch comedy actor, gave birth to Regina, a delightful baby girl. During pregnancy, Sherrie experienced “intense” back pain, which she learned was not that unusual in the third trimester.

However, instead of diminishing after birth, the pain got worse. Sherrie also became weak, and her cognitive abilities began to decline. That’s when she and her husband Alec realized something was wrong, though her original doctors were slow to detect it.

“One CT scan was unclear,” recalled Alec. “Then, there was an MRI with no follow-up. We waited for more than a month.”

The bad news came on Sherrie’s 34th birthday: EGFR-positive lung cancer, and it had spread: a “golf ball-sized tumor” in her brain and other tumors in her spine and pelvis.

EGFR-positive cancer is triggered by a defect in the epidermal growth factor receptor, found in both normal and cancer cells. The mutation leaves the receptor stuck in the “on” position, causing uncontrolled growth. EGFR-positive cancer occurs mostly in women and primarily among nonsmokers.

Fortunately, chemotherapy and several targeted therapies, known as EGFR inhibitors, have shown remarkable results. Though when Sherrie heard “lung cancer,” all she felt was fear.

“It threw me for a loop,” she said. “I was terrified. Both my in-laws died of lung cancer. I was thinking the worst.”

Sherrie began radiation treatment for the brain tumor, but her condition was deteriorating rapidly. Her father called a friend who worked at City of Hope and urged his daughter to visit the place he called “the best of the best.”

City of Hope is a world leader in cancer research, treatment and prevention. Here, doctors partner with scientists to transform laboratory breakthroughs into treatments that outsmart cancer, as well as diabetes and other life-threatening diseases.

U.S. News & World Report has ranked us among the country’s elite cancer hospitals for more than a decade.

Most important, at City of Hope our goal is to care for the whole person, so that life during treatment and after cancer can be rich and rewarding. We work with our patients and their families at each step of the journey, providing interdisciplinary supportive services, including psychology, patient education, support groups, social work, physical and occupational therapy, and nutritional and financial counseling.

By the time Sherrie made it to her physician’s office at City of Hope, she was in a wheelchair and in such mental decline she could not speak nor fully comprehend conversations.

“She was on the brink of death,” recalled her oncologist Erminia Massarelli, M.D., Ph.D., M.S.

But no one in the room was giving up.

“At first I thought to myself, ‘God help us, this will be tough,’ Massarelli remembered.

“But I never lose hope. I’ve treated other patients like Jessica, and I’ve witnessed miracles made possible by drugs that target EGFR mutations. It can truly be a ‘Lazarus effect’ — when a patient thought to be lost is brought all the way back to health.

“I had faith I was going to live,” said Sherrie, whose positive attitude was well known to her family. Early on, when one doctor began talking about “quality of life,” implying Sherrie might not survive very long, Sherrie’s mom cut him off. “No!” she said. “My daughter wants to fight through this!” Too weak to speak, Sherrie gave a thumbs up.



Jessica Sherrie with her husband, Alec, and daughter, Regina. Jessica battled cancer and COVID-19 simultaneously while a patient at City of Hope.



Jessica Sherrie holds her daughter, Regina.

The Sherrie family liked Massarelli immediately.

“We got along really well,” said Sherrie. “She really knew what she was doing, and I knew I was getting the best care from one of City of Hope’s top doctors.”

Plus, there was the common bond of motherhood.

“Being a mom myself, I understand how determined she was to live for her daughter,” Massarelli said.

There would be many setbacks. Treatment with the EGFR inhibitor Tagrisso had to be stopped when Sherrie developed lung inflam-

‘We got along really well. She really knew what she was doing, and I knew I was getting the best care from one of City of Hope’s top doctors.’

mation, a rare side effect that put her in the hospital for weeks. She was switched to chemotherapy. Then, as she began rehab to start walking again, Sherrie tumbled and broke her hip, leading to six more weeks in a wheelchair as she convalesced.

Then, on New Year’s Eve, Sherrie tested positive for COVID-19.

Though it was a mild case (“Two days,” she said. “Like a cold.”), it could not be ignored, and this is where Sherrie benefited from many months of hard work, painstaking precautions and invaluable experience gained by the patient safety specialists at City of Hope.

Everything was in place to treat Sherrie when COVID-19 struck. She received bamlanivimab, an antibody treatment currently authorized for emergency use by the Food and Drug Administration. It worked well. Meanwhile, she continued her chemo, which is also working, along with physical therapy. As a result, Sherrie was finally able to walk into her most recent follow-up exam, and when Massarelli told her the tumors were shrinking, “she gave me a big hug,” said Sherrie, smiling.

The Sherries’ story carries a double message.

First, perhaps most important: The care is still there.

“We haven’t stopped providing excellent

cancer care, despite COVID-19,” Massarelli said. She’s concerned that people fearing infection may delay diagnosis or treatment. Fight that fear. “Call us right away.”

Second, attitude matters.

“Stay positive. Don’t give up,” said Sherrie. “I know that the fact I was so determined helped me.” She admits to having more than a few bad days, but she urges, “Do what you can to overcome your fears.”

The Sherries are planning ahead should the tumors begin to grow again. Sherrie is currently undergoing genetic testing to determine if she has any other mutations — information that could be useful down the road if her chemo stops working, so another targeted therapy can be identified. Plus, she’s ready for newer treatments in development, should they become necessary.

And of course, there’s nothing like a new addition to the family to really change your outlook.

“When you have Regina to consider, things really start to matter,” Sherrie said.

“She’s worth fighting for.”

This article was provided by City of Hope. For more information, visit CityofHope.org, or call 626-256-HOPE (4673).



CITY OF WHAT MATTERS MOST

Through pioneering research that powers hundreds of clinical trials each year, City of Hope is discovering new, innovative ways to use your unique genetic and molecular profile to identify the best treatment for your cancer. And delivering leading-edge treatments to your community is at the heart of everything we do – with 30 locations in our clinical network, unparalleled cancer care is never too far away. We focus on bringing you lifesaving therapies, so that you can focus on the people who make life worth living. **Discover more at CityofHope.org**



CANCER AWARENESS

Prevention and Early Detection Face Societal Challenges

Historical gains in smoking cessation undercut by social and geographic disparities

Cancer prevention and early detection measures show mixed progress, and substantial racial/ethnic, socioeconomic, and geographic disparities continue to exist according to the recent American Cancer Society (ACS) article on cancer prevention and early detection efforts in the United States in 2018 and 2019. All data was compiled prior to the COVID-19 pandemic.

This study, which appears in *Cancer Epidemiology, Biomarkers & Prevention*, a journal of the American Association for Cancer Research, and accompanies the ACS's biennial report, *Cancer Prevention & Early Detection Facts & Figures*, is one of the only sources that looks at major modifiable cancer risk factors, including tobacco use, obesity, diet and physical activity, HPV vaccination, ultraviolet radiation exposure, environmental exposure, and screening test use.

In 2021, an estimated 608,570 cancer deaths are expected to occur in the U.S. with about 45% attributable to modifiable risk factors, such as cigarette smoking, excess body weight, alcohol intake, physical inactivity, and unhealthy diet. Cigarette smoking alone accounts for nearly 30% of cancer deaths.

The article, led by Priti Bandi, PhD, reported a mixed picture with historic lows in smoking prevalence but suboptimal obesity, cancer screening, and HPV vaccination levels. Additionally, racial/ethnic, and socioeconomic status disparities persisted across most major modifiable cancer risk factors and preventive outcomes.

TOBACCO

Cigarette smoking in 2019 reached a historic low (14.2%) mainly because 61.7% (54.9 million) of all persons who ever smoked quit (a measure also known as the *quit ratio*). While the quit ratio has improved across most subpopulations since 1965, it continues to be lower among persons who are Black, American Indian/Alaska Native, poor, lower educated, lesbian, gay, or bisexual, and residents of Southern states.

Persons who smoke in many of these same subgroups also have lower levels of recent successful cessation, despite having similar or higher quit attempt levels. This disparity was most striking among lower-income and Medicaid insured or uninsured persons in whom the successful cessation rate is about 40% lower than higher income and privately insured persons respectively, even though their quit attempt prevalence were similar.

Despite being recommended as effective clinical cessation interventions since the late-1990s, only 71.7% reported receipt of medical doctor advice to quit and just about one-in-three used evidence-based cessation treatments for tobacco dependence in 2018-2019, with significantly lower levels among those who were Hispanic, younger, and Southern residents.

"While historical gains in smoking cessation have led to steep declines in lung cancer mortality in the past decade, substantial progress can still be made by improving cessation outcomes among socially vulnerable groups. Much can be achieved by expanding tobacco cessation coverage in state Medicaid programs and equitably implementing effective tobacco control policies within and across U.S. states," said Dr. Bandi.

CANCER SCREENING

Early detection of cancer through screening reduces mortality from cancers of the breast, cervix, colon, rectum, and lung. Colorectal and cervical cancers screening can also prevent these cancers by identifying precancerous lesions that can be removed. Cancer screening prevalence was suboptimal in 2018 (colorectal cancer \geq 50 years: 65.6%; breast \geq 45 years: 63.2%; cervical 21-65 years: 83.7%), especially among uninsured adults (colorectal: 29.8%; breast: 31.1%).

Approximately 18% of cancer cases in the U.S. can be attributed to a combination of excess body weight, insufficient physical activity, unhealthy diet, and consumption of alcoholic beverages.

EXCESS BODY WEIGHT

Obesity levels remain high in 2017-2018. Among adults \geq 20 years, the prevalence of obesity was 42.4% (an estimated 99.14 million adults), and the prevalence of overweight was 30.7%. Overall, obesity prevalence was disproportionately higher among Black (56.9%) and Hispanic (43.7%) women and lowest among Asian men (17.5%) and women (17.2%).

PHYSICAL ACTIVITY

In 2018, over a quarter (25.6%) of adults reported no leisure time physical activity. The disparity by education was vast, ranging from nearly half (48.2%) of people with <high school education compared to 14.5% of college graduates.

DIET

Overall, most adults do not meet the guidelines for healthy eating. In 2019, about 12.3%

of adults reported consuming three or more servings of vegetables per day and about 26.2% of adults reported eating two or more servings of fruit daily. Vegetable consumption was higher among Asian and White women than Hispanic or Black women.

ALCOHOL

In 2018, an estimated 5.1% of adults were classified as heavier drinkers (12+ drinks in lifetime, and >14 drinks per week for men; >7 drinks per week for women). Heavier alcohol consumption increased with higher levels of education among women (2.4% with less than a high school diploma vs. 6.4% of college graduates); whereas among men prevalence was highest (7.1%) in men with less than a high school diploma and lowest (4.2%) among college educated.

HPV VACCINATION

In 2019, data show the HPV vaccination in adolescents (aged 13-17 years) remains underutilized and over 40% were not up to date. In adults (ages 19-26 years), 52% of women and 31.7% of men reported ever having received one or more dose of the HPV vaccine.

"More work is needed in order to further reduce cancer risk factors and improve cancer screening," said the authors.

"Immediate actions are needed to increase smoking cessation in health disparate populations, stem the tide of obesity epidemic, and improve screening and HPV vaccination coverage."

Information for this article was provided by the American Cancer Society. Learn more at cancer.org.

Engineered Immune Cells Appear to Prevent Spread



and often spreads to their lungs.

To study the premetastatic niche, the researchers looked at the lungs of the mice after tumors formed in the leg muscle but before the cancer was found in the lungs. The immune system's natural ability to attack cancer was present but actively stifled in the lungs, the NCI scientists discovered. There were few cancer-killing immune cells, but many cells that suppress the immune system.

Myeloid cells, in particular, were abundant in the premetastatic niche and continued to gather there as the cancer progressed. Myeloid cells are part of the body's first response to infection, injury, and cancer. When they detect

a threat, they normally make interleukin 12 (IL-12), a signal that alerts and activates other immune cells. But myeloid cells in the lung premetastatic niche instead sent out signals that told cancer-fighting immune cells to stand down, the researchers found.

Together, these features of the lung premetastatic niche allow cancer cells to thrive when they spread there, Dr. Kaplan explained.

The NCI team wondered if they could take advantage of myeloid cells to spur the immune system into action in the premetastatic niche by changing the message they deliver. So, they used genetic engineering to add an extra gene for IL-12 to myeloid cells from lab mice.

"We chose myeloid cells to deliver IL-12 based on their unique ability to home to tumors and metastatic sites," Dr. Kaplan said. "With IL-12, we're turning the volume up on a message that's been quieted."

In mice with rhabdomyosarcoma, these genetically engineered myeloid cells, nicknamed GEMys, produced IL-12 in the primary tumor and in metastatic sites. As hoped, the GEMys recruited and activated cancer-killing immune cells in the premetastatic niche and lowered the signals that suppress the immune system, the researchers found.

"We were excited to see that the GEMys 'changed the conversation' in the premetastatic niche. They were now telling other immune cells to get ready to fight the cancer," Dr. Kaplan said.

As a result, mice treated with GEMys had less metastatic cancer in the lungs, smaller

tumors in the muscle, and they lived substantially longer than mice treated with nonengineered myeloid cells. The researchers found similar results when they studied mice with pancreatic tumors that spread to the liver.

The NCI team also found that, in combination with chemotherapy, surgery, or T-cell transfer therapy, the effects of the GEMy treatment improved. For example, giving mice a single dose of chemotherapy two days before the GEMy infusion cured mice with rhabdomyosarcoma, meaning the treatment completely eliminated all traces of cancer for more than 100 days.

"I have never seen that kind of durable cure in my research before. Typically, cancer growth will slow down after treatment, but then it will come back with a vengeance," Dr. Kaplan said.

The team also found evidence that the chemotherapy and GEMys combination might prevent cancer from coming back. When the researchers reintroduced cancer cells into mice that had been cured by the combination treatment, tumors didn't form. This suggests that the combination treatment leaves a long-lasting "immune memory" of the cancer, the researchers explained.

As a final step in their study, the researchers created GEMys from human cells grown in the lab. In lab dishes, the genetically engineered human cells produced IL-12 and activated cancer-killing immune cells.

For more information about NIH and its programs, visit nih.gov.

Most Adults Lack Knowledge About Palliative Care

The majority of surveyed Americans had an inadequate understanding of palliative care, and frequency of health care utilization was one determinant of knowledge, according to a study published in *Cancer Epidemiology, Biomarkers & Prevention*, a journal of the American Association for Cancer Research.

Palliative care aims to improve the quality of life for patients and caretakers by addressing the physical, psychological, and logistical challenges associated with a disease or its treatment. In contrast to hospice, which provides comfort care for patients who have stopped treatment and are near the end of life, palliative care serves as an adjunct to life-sustaining treatments by addressing the side effects of treatment or symptoms of the disease.

“Despite the known benefits of palliative care and its endorsement by the American Society of Clinical Oncology and the National Comprehensive Cancer Network, we have not seen an increased uptake of palliative care by those who need it most,” said Motolani Ogunsanya, PhD, an assistant professor at The University of Oklahoma Health Sciences Center. “A common misconception is that palliative care is only for end-of-life care when, in fact, it can begin at any point in the disease course.”

To study the extent of people’s knowledge about palliative care and understand how various factors impact knowledge of palliative care across the American population, Ogunsanya and colleagues analyzed data from a National Cancer Institute’s Health Information National Trends Survey (HINTS) from 2018. The dataset included self-reported demographic and

clinical information, such as sex, age, education level, current health status, cancer history, and frequency of health care utilization, among others. Respondents self-reported their knowledge of palliative care by selecting between: “I’ve never heard of it,” “I know a little bit about palliative care,” and “I know what palliative care is, and I could explain it to someone else.” The first two responses were grouped together as inadequate knowledge, and the final response was considered adequate knowledge.

Among the 3,450 survey respondents, approximately 65 percent identified as non-Hispanic white, at least 90 percent had health insurance, about 60 percent had utilized the health care system more than twice in the past year, and about 10 percent had been previously diagnosed with cancer.

Overall, only 11 percent of the respondents reported adequate knowledge of palliative care. Women and married individuals were twice as likely to have adequate knowledge when compared with men and single respondents, respectively. Those who had a college degree were over 13-times more likely to have adequate knowledge of palliative care compared with respondents without a high school degree.

Health care utilization was also associated with knowledge of palliative care, as those with a regular source of medical care were 2.67 times more likely to have adequate knowledge of palliative care than those without regular medical care. In addition, respondents with a prior cancer diagnosis were 51 percent more likely to have adequate knowledge of palliative care than those who had never been diagnosed

with cancer. Ogunsanya noted that this might be due to the increased engagement patients with cancer have with the health care system.

“We found that in addition to personal factors, such as education level or marital status, the frequency of health care utilization had a significant impact on an individual’s understanding of palliative care,” said Ogunsanya.

A limitation of the study was that knowledge of palliative care was self-reported; however, Ogunsanya noted that this mode of data collection also provided an important perspective. “How someone perceives their own knowledge of palliative care may reveal more about their likelihood to pursue palliative care than a more objective measure,” she

‘Since health care providers are often the first and most trusted source of health care information, educating physicians on palliative care and encouraging them to discuss it with their patients and caretakers is one potential strategy to increase understanding of palliative care.’

“This is a novel finding for the palliative care field and provides important insight into how we might be able to improve knowledge of this service.

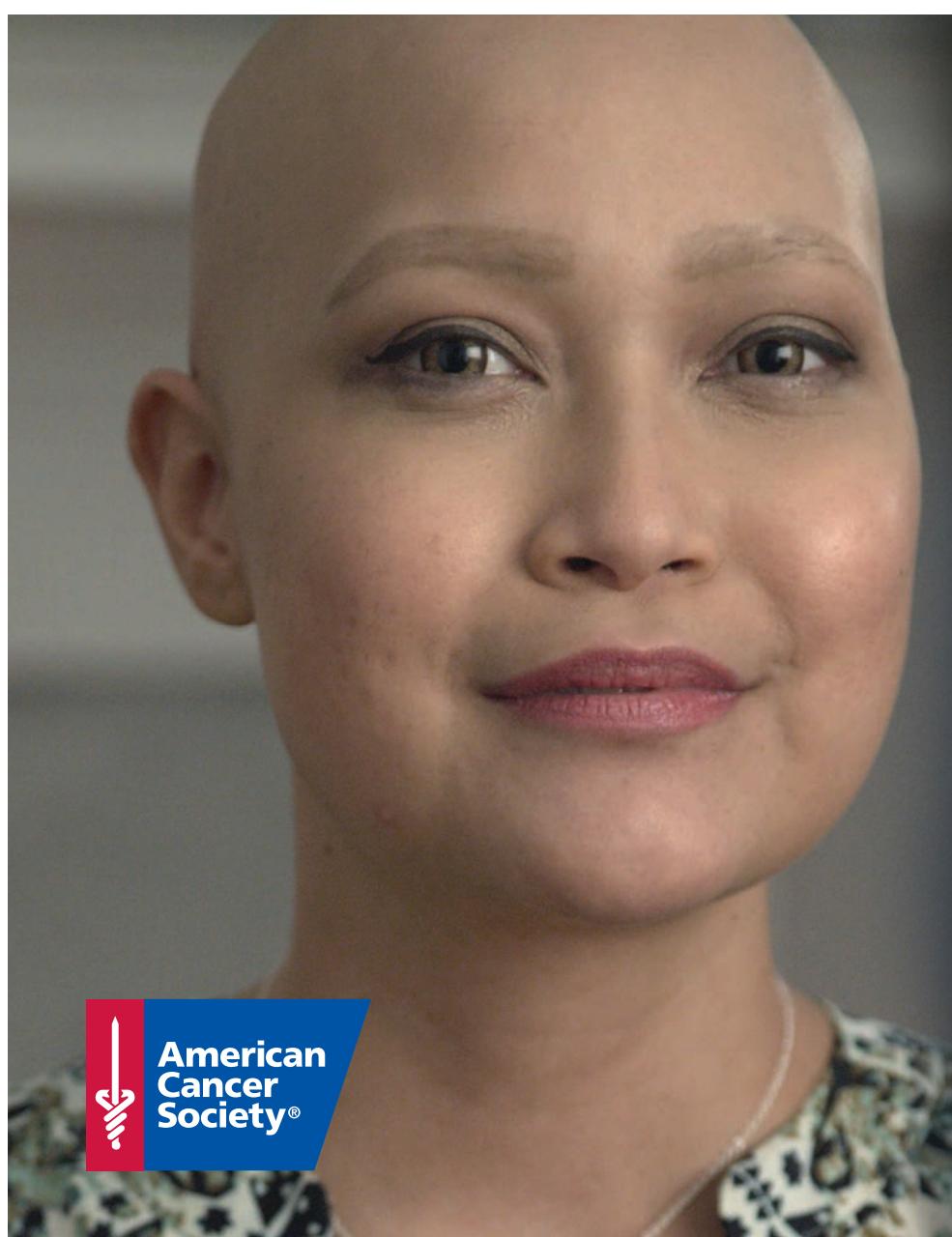
“Since health care providers are often the first and most trusted source of health care information, educating physicians on palliative care and encouraging them to discuss it with their patients and caretakers is one potential strategy to increase understanding of palliative care,” Ogunsanya noted. She added that addressing additional barriers to palliative care, such as misconceptions and lack of resources or time, are also important approaches to increasing awareness.

explained. “If someone is not confident in their knowledge of palliative care, they may be less inclined to ask for it, regardless of how well they do understand it.”

Additional limitations of the study included the exclusion of individuals who did not speak English or Spanish and those without a permanent address.

This research was supported by The University of Oklahoma Health Sciences Center. Ogunsanya declares no conflicts of interest.

Information for this article was provided by the American Association for Cancer Research. Learn more at aacr.org.



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HASN'T
STOPPED.**
***So neither
have we.***

Victoria, Cancer survivor

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CANCER AWARENESS

Early Detection Legislation Introduced in Senate

The Prevent Cancer Foundation announced this month that it applauds the Senate introduction of the Medicare Multi-Cancer Early Detection Screening Coverage Act of 2021. This development follows the House's introduction of H.R. 1946 in March and strong support of the bipartisan legislation from more than 300 organizations across all 50 states.

Senators Mike Crapo (R-ID), Michael Bennet (D-CO), Ben Cardin (D-MD) and Tim Scott (R-SC) earlier this month introduced this companion legislation in the Senate to help patients on Medicare and their health care providers find cancer in earlier stages, increasing the chances of successful treatment.

The Medicare Multi-Cancer Early Detection Screening Coverage Act of 2021 aims to modernize Medicare to ensure seniors have access to multi-cancer early detection (MCED) tests once approved by the Food and Drug Administration (FDA). Multiple MCED tests are currently in development or clinical testing, and this emerging field holds enormous prom-

'We strive to work side by side with lawmakers and advocates who understand that policy must keep up with medical advances.'

ise to increase early detection of cancers.

Currently, there are available routine screenings for only five cancers, and most of the deadliest cancers have no screening options. The goal of multi-cancer early detection tests is to utilize advances in genomic science and computing power to find multiple types of cancer through a blood test.

The Prevent Cancer Foundation has long worked as a champion for cancer prevention and early detection efforts.

"We strive to work side by side with lawmak-

ers and advocates who understand that policy must keep up with medical advances," said Carolyn Aldigé, founder and CEO of the Prevent Cancer Foundation. "Detecting cancer early is one of the keys to ending cancer as we know it. This legislation will help ensure that we don't have unnecessary barriers to access when breakthrough screening technologies are developed."

Aldigé has issued a thank you to the bill's co-sponsors, who are leading the way in Congress to make potentially lifesaving cancer detection technologies available to those who

need them most.

The Prevent Cancer Foundation is currently celebrating 35 years as the only U.S. nonprofit organization focused solely on saving lives across all populations through cancer prevention and early detection. Through research, education, outreach and advocacy, we have helped countless people avoid a cancer diagnosis or detect their cancer early enough to be successfully treated.

The Foundation is rising to meet the challenge of reducing cancer deaths by 40% by 2035. To achieve this, we are committed to investing \$20 million for innovative technologies to detect cancer early and advance multi-cancer screening, \$10 million to expand cancer screening and vaccination access to medically underserved communities, and \$10 million to educate the public about screening and vaccination options

For more information, please visit preventcancer.org.

Improved Detection Strategies Needed in Breast Cancer Survivorship Care

A new study finds breast cancer survivors in general have higher risk of new cancer diagnosis compared to healthy individuals. The article, which appears in CANCER, states that compared to the general population in the United States, the risk of new cancer diagnoses among survivors was 20% higher for those with hormone receptor (HR) positive cancers and 44% higher for those with HR-negative cancers.

Breast cancer is the most commonly diagnosed and prevalent cancer among women in the U.S., with over 3.9 million living breast cancer survivors as of 2019. The number of survivors is expected to increase with the aging population and advances in breast cancer treatment.

Subsequent primary cancer (SPC) after breast cancer is a well-known late effect, but the risk by breast cancer subtype and age at diagnosis was largely unknown except for contralateral breast, lung, and ovarian cancers. This study, led by Hyuna Sung, PhD, is the first to examine the risk of a range of SPCs including 26 types, and evaluate the risk by tumor subtypes and diagnosis age of breast cancer. This study included women (aged 20 to 84 years) diagnosed with invasive breast cancer from 1992-2015 and who survived for a year or more.

"With most women living decades after a breast cancer diagnosis, it is important to identify survivors at higher risk for future cancers and provide tailored recommendations for risk reduction and early detection," said Dr. Sung.

Data show that the risk differs by survivor characteristics, such as breast cancer subtypes and their diagnosis age. For example, several cancers including subsequent breast cancer, acute nonlymphocytic leukemia, ovarian cancer, and lung cancer are more likely to develop after HR-negative cancer than after HR-positive cancer. Women who were first diagnosed with breast cancer before age 50 also have greater risk for subsequent cancer than women with later onset breast cancer.

"Differential risk of subsequent cancer according to survivor characteristics highlights



that more targeted approaches for cancer prevention and early-detection strategies are needed in survivorship care planning to mitigate the burden of subsequent cancers in the growing population of survivors," said the authors.

Information for this article was provided by the American Cancer Society. Learn more at cancer.org.

'Differential risk of subsequent cancer according to survivor characteristics highlights that more targeted approaches for cancer prevention and early-detection strategies are needed in survivorship care planning to mitigate the burden of subsequent cancers in the growing population of survivors.'