



RESEARCH

Bright Minds, Big Ideas



At the American Cancer Society, we're doing everything we can to end cancer.

Bringing together the brightest minds with the biggest ideas.
Investing in high-reward projects to find answers faster.

Pushing innovation like never before. And getting creative about
how we tackle cancer – so we can end cancer as we know it today,
making it much more rare and much less deadly.

Our Guiding Principles

Creativity and innovation are essential principles to fuel our progress. Creating new and different ways to fight cancer is crucial to our success.



Creativity

Doing something in a way that's never been done before – that's creativity. Without it, progress would be impossible because we'd have nothing new to build on.



Innovation

Improving on what already exists – that's innovation. Through collective intelligence, we push progress faster, building on the best ideas to make them better.

Following are four unique examples of how these principles can help push cancer science forward.

Creativity



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I got my American Cancer Society grant four years ago, and it was the predominant grant I used to do all of this work. If I had not had this funding I would not be where I am right now with the test.

Shahab Asgharzadeh, MD | Pediatric Oncologist, Children's Hospital Los Angeles
American Cancer Society Grantee

New test helps spare children with brain cancer from toughest treatments.

“The standard treatment for medulloblastoma [the most common type of brain tumor in children] includes radiation to the whole brain and spine, as well as surgery and chemotherapy. Unfortunately, radiation to the brain has significant long-term side effects in children. Recent studies have shown that some children can be cured of medulloblastoma using only surgery and chemotherapy. If we are able to identify ahead of time patients whose medulloblastoma was curable with chemotherapy alone, we could spare many children the devastating effects of radiation.”

Thanks to Asgharzadeh, this is now possible. He designed a test that doctors can use to determine which children will benefit most from – or absolutely need – radiation.



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My father's sister died from ovarian cancer in 1999, when I was young. She had a lot of symptoms, but as is common with ovarian cancer, doctors dismissed her concerns as other things women get: menopause, indigestion. She did a lot of research and diagnosed herself. She went back to the doctor and said, 'I think I have ovarian cancer. We need to look into this.' Her experience made me interested in why there weren't better ways of understanding how to diagnose patients.

Rebecca Wates, PhD | University of Kansas Medical Center
American Cancer Society Grantee

Ovarian cancer researcher aims to find new treatment.

Despite the success of targeted therapy in many cancers, there are limitations of a single-target drug for ovarian cancer. “These tumors are very diverse in their genetic makeup. The primary tumor could be different than the spreading tumors. And recurrent tumors can be different from those two.”

Wates is investigating a different approach. She's looking for “a compound that kills the tumor based on something it needs to survive.”

With her grant from the American Cancer Society, Wates has a shot at changing the outlook for ovarian cancer – which has a relative 5-year survival rate of 46% and is the leading cause of gynecologic cancer deaths. The work she's just begun will build on her previous research to find a treatment that is less toxic than current treatments, and yet kills a broad spectrum of ovarian cancer cells.

Innovation



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Our finding that colorectal cancer risk for millennials has escalated back to the level of those born in the late '80s is very sobering. Educational campaigns are needed to alert clinicians and the general public about this increase to help reduce delays in diagnosis, which are so prevalent in young people, but also to encourage healthier eating and more active lifestyles to try to reverse this trend.

Rebecca Siegel, MPH | Strategic Director of Surveillance Information Services
American Cancer Society

New analyses uncover important trends in colorectal cancer.

American Cancer Society researchers are looking at data in new ways – leading them to discover urgent issues in colorectal cancer.

Recently, they found that new cases of colon cancer and rectal cancer are occurring at an increasing rate among young and middle-aged adults in the US. Once age is taken into account, those born in 1990 have double the risk of colon cancer and quadruple the risk of rectal cancer compared to people born around 1950, when risk was lowest.

They have also found that there are three distinct “hot spots” where death rates from colorectal cancer remain higher compared with the rest of the US – the lower Mississippi Delta, west central Appalachia, and eastern Virginia/North Carolina.

“These areas are characterized by high poverty, which is associated with higher colorectal cancer incidence and death rates. Improvements in the early detection and treatment of cancer disseminate much more slowly in underserved populations.”



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Our ultimate goal is to bring together two distinct approaches – one that targets the cancer and the other targets the patient – in the most thoughtful way.

Jedd Wolchok, MD, PhD | Memorial Sloan Kettering Cancer Center
American Cancer Society-SU2C Lung Cancer Dream Team Co-leader

Team merges two treatment types to improve outcomes for lung cancer patients.

More than 35 researchers are working together as part of a Lung Cancer Dream Team to address difficult-to-treat lung cancers – those with a common gene mutation called KRAS, which occurs in 20% to 30% of lung cancers. There are currently no drugs that attack KRAS.

Researchers are combining their unique specialties and merging two highly promising treatment approaches: targeted therapy and immunotherapy.

“The fact that we have people coming from two completely distinct research backgrounds – one group focused on immunotherapy and the others cancer biologists specializing in targeted therapies – means that this research is not something we could have done separately.”

Science takes time.

Our future is often defined by our past.

Take, for example, one of the most important discoveries in advancing the treatment and prevention of breast cancer. Identifying the BRCA1 gene in 1990 paved the way for understanding the link between mutations in the BRCA1 and BRCA2 genes and hereditary breast and ovarian cancers. More than three decades later, we’re building on that science to uncover how mutations in these genes impact the likelihood of responsiveness or resistance to new chemotherapy drugs.



1950-1990

Ongoing research established that there were genetic links to breast and ovarian cancers. What those links were, remained unknown.

1991

Scientist Patrice Watson, PhD, and colleagues found that the BRCA1 gene was also linked to ovarian cancer.

1994

Scientists discovered a second gene linked to breast cancer – BRCA2.

1998

Oncologist and researcher Bernard Fisher, MD, and colleagues found that the chemotherapy drug tamoxifen decreased the incidence of breast cancer by nearly 50% in women who were at increased risk due to carrying a BRCA1 and/or BRCA2 mutation.

1990

Researcher Mary-Claire King, PhD, discovered the first specific gene that if mutated could increase the risk of breast cancer. She named the gene BRCA1.

1994

Researchers discovered that the BRCA1 genetic mutation was strongly linked to Ashkenazi Jewish ancestry.



1996

Mary-Claire King, PhD (above); Elaine Ostrander, PhD; and colleagues did the research needed to be able to study BRCA1 in animals.



2004

Scientist Susan Neuhausen, PhD, demonstrated that prophylactic bilateral mastectomy substantially reduced the incidence of breast cancer among women with mutations in the BRCA1 gene.

 Funded Research

THE FUTURE

The American Cancer Society continues to fund ongoing research into breast cancer risk. This is a major focus for our epidemiology team; they are studying the effect of exercise, weight, and diet on breast cancer risk. We are also funding researchers who are working on understanding the underlying biological mechanisms that cause breast cancer to develop and to spread. And we remain committed to improving treatment and funding research into how mutations in BRCA1 and BRCA2 impact the likelihood of responsiveness or resistance to new chemotherapy drugs.



2009

Oncologists Roger A. Greenberg, MD, PhD, and Susan Domchek, MD, found a way to determine (in mice) whether BRCA1 and BRCA2 mutations will cause cancer.

 Funded Research

Science doesn't only happen in the lab.

American Cancer Society researchers have been collecting and analyzing data from millions of people in the United States since the 1950s.

Our largest-ever study, Cancer Prevention Study-II (CPS-II), includes 1.2 million men and women. Begun in 1982, the study continues to lead to new discoveries today – including **650 scientific papers**, with findings that have reshaped what we know about preventing cancer.



Cancer Prevention Study II (CPS-II) started in

1982.



Beginning in the late 1980s, CPS-II helped to establish the link between obesity and death from breast, colorectal, and other cancers.



In the early 1990s, CPS-II was the first prospective study to find a link between regular aspirin use and lower risk of colorectal cancer. This issue is still being studied today.



Starting in the late 1990s/early 2000s, our studies showed that high red and processed meat and alcohol intake, low physical activity, and longer sitting time increased risk of cancer mortality. These findings contributed to the scientific evidence base for the development of the American Cancer Society Guidelines on Nutrition and Physical Activity for Cancer Prevention. This work continues today.

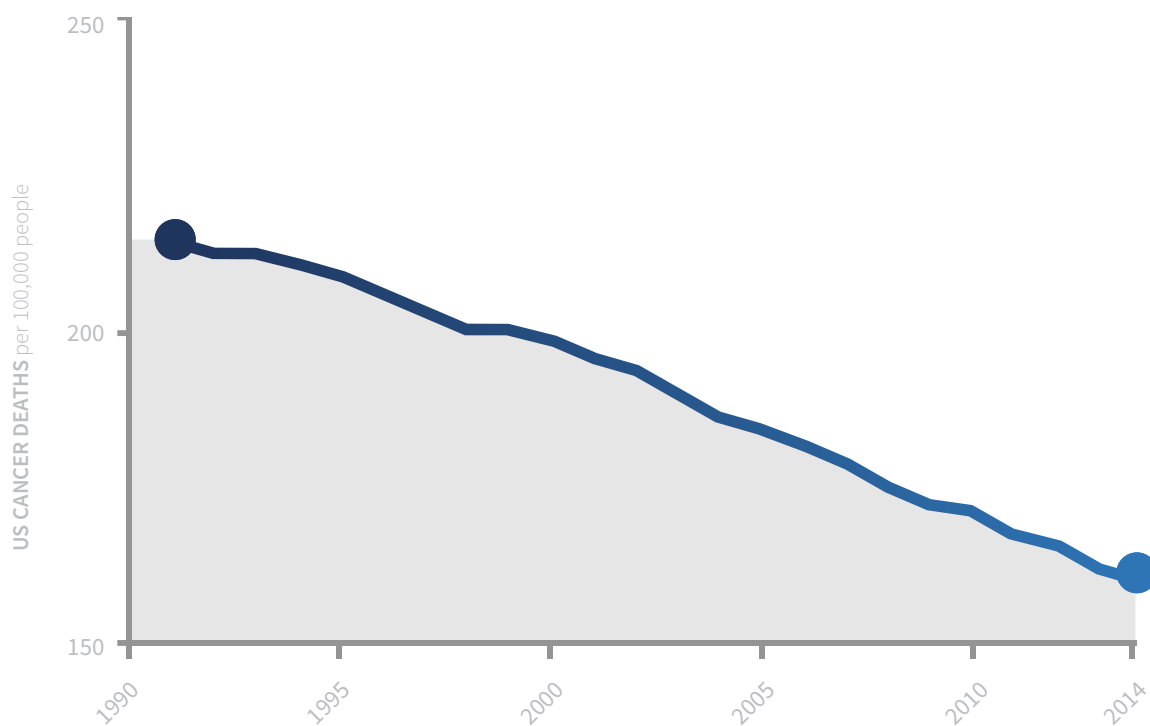
The Future

Our researchers continue to study data from CPS-II and, in the future, will begin to analyze findings from our newest long-term study, CPS-3, to learn even more about cancer risks.



Some advances take years. They're worth it.

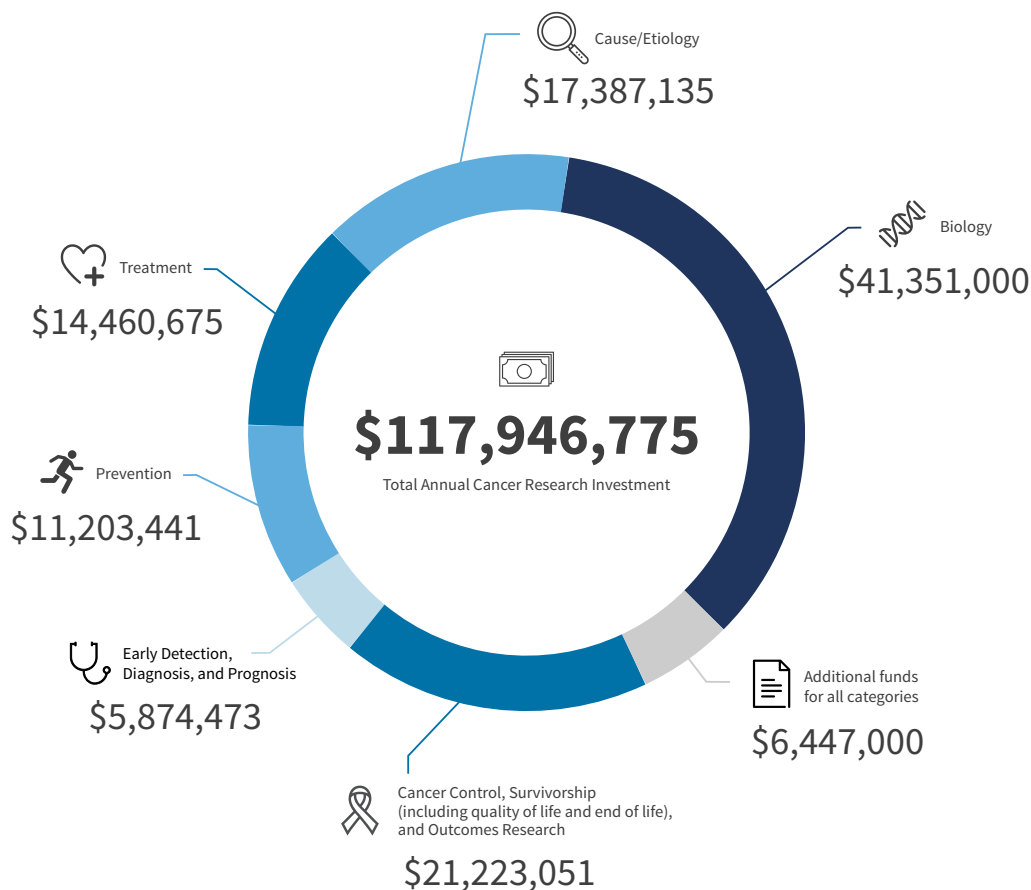
In 2014, the cancer death rate for men and women combined fell 25% from its peak in 1991. This decline translates to more than 2.1 million cancer deaths averted.



What We're Doing Right Now

Today, we're investing in cancer research from every angle. We have more than \$400 million committed to more than 750 active grants. We're supporting the work of scientists and health professionals across all aspects of cancer – from basic lab research to bedside patient care.

This investment in cancer research moves the state of the science forward every day – sometimes in small steps and often in large leaps. In 2016 alone, the American Cancer Society's own team of internal researchers published more than 150 papers, encompassing high-impact insights including connecting exercise with a lower risk of 13 types of cancer for the first time and revealing a worsening racial disparity in breast cancer death rates in women.



We have more to do.

While we fund as much cancer science as we can, every year, we have to turn away a significant number of great research ideas due to budget constraints. We need your help to fund more than 200 grants waiting for support. We are more committed than ever to accelerating research, which is why we announced our goal to double our annual funding for research by 2021.



Now is the time – We have never been more optimistic.



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This mindset moves us to seek out what's new and what's next – the creative ideas and innovative approaches that will push cancer research forward.

Otis Brawley, MD | Chief Medical Officer

The American Cancer Society invests in high-value fundamental research. We fund university investigators who ask smart questions that expand our knowledge and understanding of cancer. Many of these questions take years to answer, but this is the type of basic research that has described the inner workings of the normal cell and the molecular aberrations that make a cell cancerous. This type of research often does not lead to patentable information, so it is not often pursued by commercial companies in search of new medications. But it is no less important, and is in fact vital to advancing our understanding of cancer.

By researching cancer broadly and studying human biology deeply – instead of focusing on a single treatment approach or specific cancer type – we empower scientists to uncover vital aspects at play in cancer that would otherwise go unnoticed. The researchers we back are advancing our collective grasp on all of the genomic variables connected to cancer. Their findings will help unleash new ways of identifying and describing subtypes of cancer – information we need to make precision medicine a reality. We know we don't have all the answers. That premise is essential to how we work.



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Our comprehensive approach to cancer research has led us to funding scientists who have made some of the most important advances in the field – and continue to do so today.

William Chambers, PhD | Senior Vice President, Extramural Research

Our Extramural Research program, the grant-making arm of the American Cancer Society, invests in outstanding science across the cancer continuum. We look for the brightest minds – researchers who have big ideas about how to answer the toughest questions, from how to unravel the most basic aspects of cell biology to what policies and practices need to be in place to achieve the best in cancer care.

We fund many young, independent investigators. But we know collaboration is key. That is why we also fund teams of scientists and ensure new researchers are paired with seasoned mentors. And we are committed to investing in the next generation of cancer care professionals, providing grants for nurses, social workers, and primary care doctors.

Now is the time – We have never been more optimistic.



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Nearly 65 years after the launch of our first cohort study, the Epidemiology Research program remains one of the most active and highly respected cancer epidemiology programs in the world. Our new research will inform improved personalized cancer risk prediction, and thus, clinical decision making for cancer care.

Susan Gapstur, PhD | Vice President, Epidemiology Research

Our Epidemiology Research program is a leader in researching the causes of cancer. We have been producing news-making and practice-changing findings for decades. Our large cohort studies – the Cancer Prevention Studies (CPS) – have led to countless research findings that have significantly advanced our understanding of the causes of cancer and helped reduce cancer mortality. And our work continues today. The changing landscape of cancer risk factors – such as e-cigarettes, poor sleep, and greater sedentary time – requires new research. Thanks to extraordinary recent technology advances, our studies now involve innovative survey- and biospecimen-based research, which will allow us to study cancer causes in ways that were never before possible.



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Despite the tremendous progress that has been made in cancer prevention, early detection, and treatment, there remains a vast disconnect between discovery and delivery of cancer prevention and cancer care to all populations.

Ahmedin Jemal, PhD | Vice President, Surveillance and Health Services Research

Our Surveillance and Health Services Research program produces unique, timely, and comprehensive reports analyzing the cancer landscape – helping to make the American Cancer Society the most trusted source for cancer statistics. Our team’s flagship publication, the annual *Cancer Facts & Figures* report, has been the go-to resource since the 1950s for projections of the numbers of new cancer cases and deaths expected each year.

To continue to be at the forefront, we offer this data and more in a highly interactive, engaging, and customizable website. We are also continuously producing original high-impact studies that provide insights into topics including disparities in progress against cancer, access to care, effects of public policies, and emerging trends.



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Aggressively taxing tobacco and other harmful products is an almost certain public health winner, but to reach this goal, we must find the best ways to convince policy makers of this approach and to help the most vulnerable populations.

Jeffrey Drope, PhD | Vice President, Economic and Health Policy Research

Our Economic and Health Policy Research program generates cutting-edge research on economic and policy-driven strategies to reduce major cancer risk factors, including tobacco use, physical inactivity, and poor nutrition. As governments have started to recognize that taxing harmful products is an extremely effective way to mitigate harm, our researchers are determining the most effective ways to tax tobacco and sugar-sweetened beverages to maximize public health benefits, with a focus on vulnerable populations.

Despite progress, many governments have been slow to recognize these rewards; only a handful of states in the US and countries around the world tax these products effectively. To speed uptake, our researchers are identifying the most effective ways to convince policy makers that these policies are among public health’s very “best buys.”



Pennsylvania Chapter Funded Research



Project: Targeting Oncogenic Signal Transduction in Adult Ph-like ALL

Researcher: Alexander Perl, MD

Institution: University of Pennsylvania, Pennsylvania

Grant term: March 1, 2016 - February 29, 2020

Progress Made: Dr. Perl is focused on molecular level targeted therapy. He is looking at specific features in a patients' leukemia cells that predict how they will respond to certain medications. With this data, he can individualize the best treatment option which will dramatically improve response, survival and even cure

rates. His current data shows that the specific leukemia that his grant is studying is the second most common subtype in adults which means that potentially 2/3 of ALL (acute lymphoblastic leukemia) patients could benefit from optimized treatment. Dr. Perl and his team continue to refine their test and compare it to existing diagnostic methods as they begin long term experiments to test combinations of low toxicity chemo with medications. With the results from these experiments, dr. Perl hopes to guide future clinical trials.



Project: Translocator Protein-targeted Photodynamic Therapy for Ovarian Cancer

Researcher: Mingfeng Bai, Ph.D.

Institution: Vanderbilt University Medical Center, Tennessee

Grant term: July 1, 2017 - June 30, 2021

Progress Made: Dr. Mingfeng Bai is studying a light-based therapy technique to treat ovarian cancer in a targeted manner is making great progress. His team has successfully synthesized 5 translocator protein-targeting compounds and three of

them have shown promising nanomolar binding affinities. This means that they have developed three promising molecules that attach to proteins in the cell and that will trigger cell death in the cancer cells. With that progress they are now working on moving to animal studies to see how the molecules will distribute and accumulate in the tumors. If successful, they will be able to adapt this treatment to be completed with lasers that will target the molecules added to the cells to trigger the cell death.



Project: Disparities in Recurrence for Breast, Lung, and Colorectal Cancer Patients

Researcher: Michael Hassett, MD

Institution: Dana-Farber Cancer Institute, Massachusetts

Grant term: March 1, 2018 - February 28, 2021

Project Direction: Those that are African American, poor or living in rural regions are more likely to develop advanced cancer, less likely to receive treatment and die as a result of diagnosis. This project aims to better understand the rate of reoccurrence in these populations with a focus on Breast, Lung and Colorectal cancer using an innovative set of tools with the SEER-Medicare database (reflect the linkage of two large population-based sources of data that provide detailed information about Medicare beneficiaries with cancer). The evidence will, for the first time ever, identify specific sub-groups, regions and hospitals that experience inferior recurrence rates



Project: Improving Radiotherapy for Medulloblastoma via Advanced Preclinical Trials

Researcher: Stephanie Smith, Ph.D.

Institution: St. Jude Children's Research Hospital, Tennessee

Grant term: March 1, 2018 - February 28, 2020

Project Direction: Medulloblastoma is the most common malignant (cancerous) childhood brain cancer and a diagnosis generally requires an aggressive treatment plan. Despite treatment, reoccurrence is high (particularly those in the high-risk groups) with a likely spread throughout the brain and spinal cord. Radiation is critical, but also may change the genetic landscape of the tumor which may underlie treatment failure and promote growth of resistant tumors. This project will seek to identify novel treatment protocols that can be quickly translated to the clinic to improve the outcomes for the children with this difficult to treat tumor.



Project: The Impact of Bromodomain and Extraterminal Region Inhibitors on Melanoma

Researcher: Dan Erkes, PhD

Institution: Thomas Jefferson University, Pennsylvania

Grant term: March 1, 2018 - February 28, 2020

Project Direction: Metastatic melanoma is the deadliest skin cancer with only a 2-16% long term survival rate. The project will aim to improve understanding of how BET inhibitors (drug therapy) alter tumor cells and the immune system to promote anti-tumor effects. There is a focus on immunotherapy, with potential to cooperate with current and emerging chemo options to add a new drug to oncologists' arsenals.