

Treatment vaccines, which aim to trigger the immune system to fight an existing cancer, are different from vaccines that are used to prevent the cancers that are caused by viruses.

Making Inroads Against Cancer

Groundbreaking new treatments mean improved outcomes for patients, and experts believe that advancements will only get better as time goes on.

By Karen Asp

Cancer is the second leading cause of death in the United States, and while the public may be holding out hope that every last case of it will someday be curable, that magical thinking has long been abandoned by researchers. “While some cancers are curable, scientists never talk about curing cancer because we know it can come back,” says Mona S. Jhaveri, PhD, a cancer researcher and founder and director of Music Beats Cancer, a crowdfunding platform that addresses critical funding gaps for cancer-fighting innovations and research. “This disease involves genetic changes, and as you hit cancer from one direction, it can work around your treatment strategies.”

That’s why researchers have been devoting massive amounts of time and energy to developing new treatment therapies. Certainly, traditional approaches like surgery, chemotherapy and radiation remain a vital part of cancer treatments, but visionary new therapies mean that cancers can be treated more effectively, offering new hope to people who are diagnosed with the disease.

GOOD NEWS AND BAD NEWS

It’s fair to say that decades ago, a cancer diagnosis was considered a death sentence. Even as recently as 1991, 215 people out of 100,000 were dying from cancer every day. Fast-forward to 2019 and that number dropped to 146 per 100,000, according to the American Cancer Society. Lung, colorectal, breast and prostate cancers—four of the most common types in the United States—have seen the most significant improvements in survival. Today, almost half of all cancer patients can expect to live five or more years after their diagnosis, per the National Cancer Institute.

While much of this success can be credited to advances in screenings and early detection, improved treatment is also playing a role. “Of all of the cancers in the world, 80% of them are solid tumors, and for decades, all we did was cut them out, treat them with radiation or poison them with chemotherapy,” says Dr. Michael Zinner, a cancer researcher and chief executive officer and executive medical director of Miami Cancer Institute, part of Baptist Health South Florida. “Then came along targeted therapies, which have made all of the difference, the analogy being that we’re no longer doing carpet-bombing and killing everything. Instead, we’re using laser-targeted missiles to hit specific parts of the cancer and kill it, but not the cells around it.”

In spite of improved outcomes, though, the reality is that cancer diagnoses continue to rise. “Cancer is not a disease on the decline,” Jhaveri says, adding that rare cancers like pancreatic, thyroid, and head and neck are becoming more common, as are breast and colon cancers in younger patients. “More people are being diagnosed with cancer each year.”

Even more worrisome, because of a lag in cancer screenings during the pandemic, patients are showing up with more advanced diagnoses. “Reports are coming out from radiation therapists who are seeing more advanced disease than they did in 2019,” Zinner says. “Will it make a difference in terms of survival? We don’t know, but probably yes.”

GETTING PERSONAL

More cancer-treatment options are available than ever. There are seven main types of treatments, according to the American Cancer Society, with two of these—targeted therapies and immunotherapies—having the most

significant recent advancements. “There are some, like kidney cancer, that we had no treatment options for 20 years ago, but these new treatments have changed the lives of people with these cancers,” says Dr. William L. Dahut, chief scientific officer with the American Cancer Society.

Targeted therapies use drugs like monoclonal antibodies and small-molecule drugs to identify and attack cancer cells without harming the body’s normal cells. In the past, all people with a certain type of cancer, such as lung cancer, were treated pretty much the same. No more. “Over time, we’ve learned that there are multiple different subsets of lung cancer (and other cancers) which respond to very targeted therapy based on mutations in the cancer itself,” Dahut says. “These drugs are designed to treat what we call driver mutations, which lead to the progression of cancer, as well as new mutations that often develop in individuals.” Lung and kidney cancers and melanoma are examples of cancers responding well to targeted therapy.

Meanwhile, immunotherapy activates a patient’s own immune system to attack cancer. The immune system is designed to spot foreign invaders like viruses and bacteria and mount an attack against them. Yet in individuals with cancer, the immune



A simple chest X-ray can reveal a lung cancer, but it's not a reliable screening tool. A computed tomography (CT) scan is more accurate.

system is no longer able to recognize this threat (see one way to get around this in “Checkmate for One Disease?” on page 48). Through immunotherapy, though, the immune system can be turned back on and directed to kill cancer cells, Zinner says.

Although the concept has been around for centuries, the first immunotherapy for cancer was only approved in 2011. “For a long time, researchers thought the immune system was absent in cancer,” Jhaveri says. “Today, however, we understand

RESEARCH SPOTLIGHT

TARGETED TESTING

New technologies are fueling advances in blood-based testing (liquid biopsies) to pick up signs of abnormally growing cancer cells, which is broadening screening for genetic signatures of cancer. It’s part

of the evolution toward more personalized, patient-specific care that will mean diagnoses and the right treatments will be better matched to patients. At Intermountain Healthcare in Utah, researchers found that such a precision-medicine approach helped patients live longer on average and cost

the health system less than traditional strategies for people with advanced cancer. “We see doubling of overall survival, and cost savings of \$750 on average per patient,” says Dr. Lincoln Nadauld, vice president and chief of precision health and academics at Intermountain.

—Alice Park

RESEARCH SPOTLIGHT

DE-ESCALATING TREATMENT

Ductal carcinoma in situ (DCIS) is among the earliest stages of breast cancer. It doesn’t appear to grow quickly and only about 20% to 30% of DCIS progresses to become invasive breast cancer, yet many women diagnosed with DCIS will get invasive treatment in the form of surgery, radiation or a combination of both. Dr. Shelley Hwang, chief of breast cancer surgery at Duke University School of Medicine, is hoping to change this. Hwang’s study, COMET (Comparison of Operative Versus Monitoring and Endocrine Therapy), is designed to compare what happens to women who monitor their DCIS carefully with regular screening and scans, compared to those who get the standard treatment. The idea of watching a cancer, rather than taking immediate action to treat it, is a difficult one for patients and doctors alike to accept. “The challenge is to pull the rest of society with us in saying we now have biomarkers, we have data and we have clinical trials to show that a lot of the things we were doing in the past we did because we thought we had to, but we don’t really need to do everything,” Hwang says. “And I think the place to start doing that is in very low-risk conditions like DCIS.” —A.P.

The invention of 3D mammography—versus 2D—is lowering the rate of false positives.

RESEARCH SPOTLIGHT

CHECKMATE FOR ONE DISEASE?

In June, a study in the *New England Journal of Medicine* claimed unheard-of results: All 12 subjects in the trial had experienced 100% remission of early-stage rectal cancer and have remained cancer-free for two years to date. The magic bullet? A type of immunotherapy called checkpoint inhibitors.

The drugs target proteins on T cells that are called checkpoints. If the T cells find something to fight, they turn those checkpoints on. When they're no longer needed, the T cells turn them off to avoid harming normal cells. Trouble is, cancer cells have found a way to keep checkpoints turned off, which prevents the immune system from attacking and killing them. "Checkpoint inhibitors block checkpoints, which takes the brakes off the T cells so they can then attack cancer cells," explains Dr. Michael Zinner.

This study was significant for several reasons. "We've never seen a trial where 100% of patients responded," Zinner says. The study is also unique in that the inhibitors were used alone—without surgery, radiation or chemotherapy.

The therapy was for a not-so-common type of rectal cancer and the sample size was very small, so more research is needed.

Cells have all sorts of ways to communicate with each other. Checkpoints are one area that researchers are exploring.



Surviving cancer is one thing, but approximately two-thirds of patients will have to deal with "late effects" of treatments they had. This includes problems down the road with other organs, including the brain, heart and lungs.

that cancer has mechanisms to work around and hide from the immune system, which has opened the door to new treatments." Immunotherapy is used to treat many types of cancer, including melanoma and lung, kidney, colorectal, and head and neck cancers. Researchers are trying to

understand why this approach can be so beneficial for some people but not for others.

LOOKING AHEAD

While the current cancer treatment landscape should give anybody hope, the future looks even brighter.

"There's never been a better time for treating cancers and it's only going to get better," Zinner says, adding that the Food and Drug Administration is approving between 10 and 15 new cancer treatments every year. "That's more than for other diseases we treat."

All of this aligns with the Cancer Moonshot initiative, which was introduced by the Biden-Harris administration in February 2022. One of its goals is to cut cancer death rates by at least 50% over the next 25 years and prioritize cancer screenings. But while there are screening innovations constantly going on behind the scenes, "developing a screening tool that's highly accurate for each cancer is difficult, as too many false positives are costly, often requiring more—and unnecessary—invasive testing," Jhaveri says. And for some types, like ovarian cancer, surgery is often the only way to confirm the presence of cancer. The other hitch is that many people aren't getting the recommended screenings, even though they're covered by insurance (this was true before the pandemic as well).

So what does all of this mean for the Cancer Moonshot, especially in terms of cutting death rates? "If we can focus on prevention and screening and then treating, especially in the early stages, we should be able to achieve the goal," Jhaveri says.

RESEARCH SPOTLIGHT

KICKING OUT GUESTS

Shannon Mumenthaler, PhD, assistant professor of medicine at the Keck School of Medicine of the University of Southern California and chief translational research officer at the Ellison

Institute for Transformative Medicine in Los Angeles, heads a team focused on understanding the biological homes that cancer cells find in the body. The hope is that by making this environment less hospitable, it will open up entirely new ways to treat the disease. Eventually, such improvements in treatment will

spill over into preventing cancer as well. The better researchers get at identifying the key drivers of cancer, and which risk factors are the hallmark of more aggressive disease, the sooner they can start looking for these among their patients and refine how their health is monitored for signs of the devastating disease. —A.P.