SURVIVING CANCER

Revolutionary new treatments are reshaping the field of oncology, how patients get to remission and how they thrive after.

By Jackie Mantey

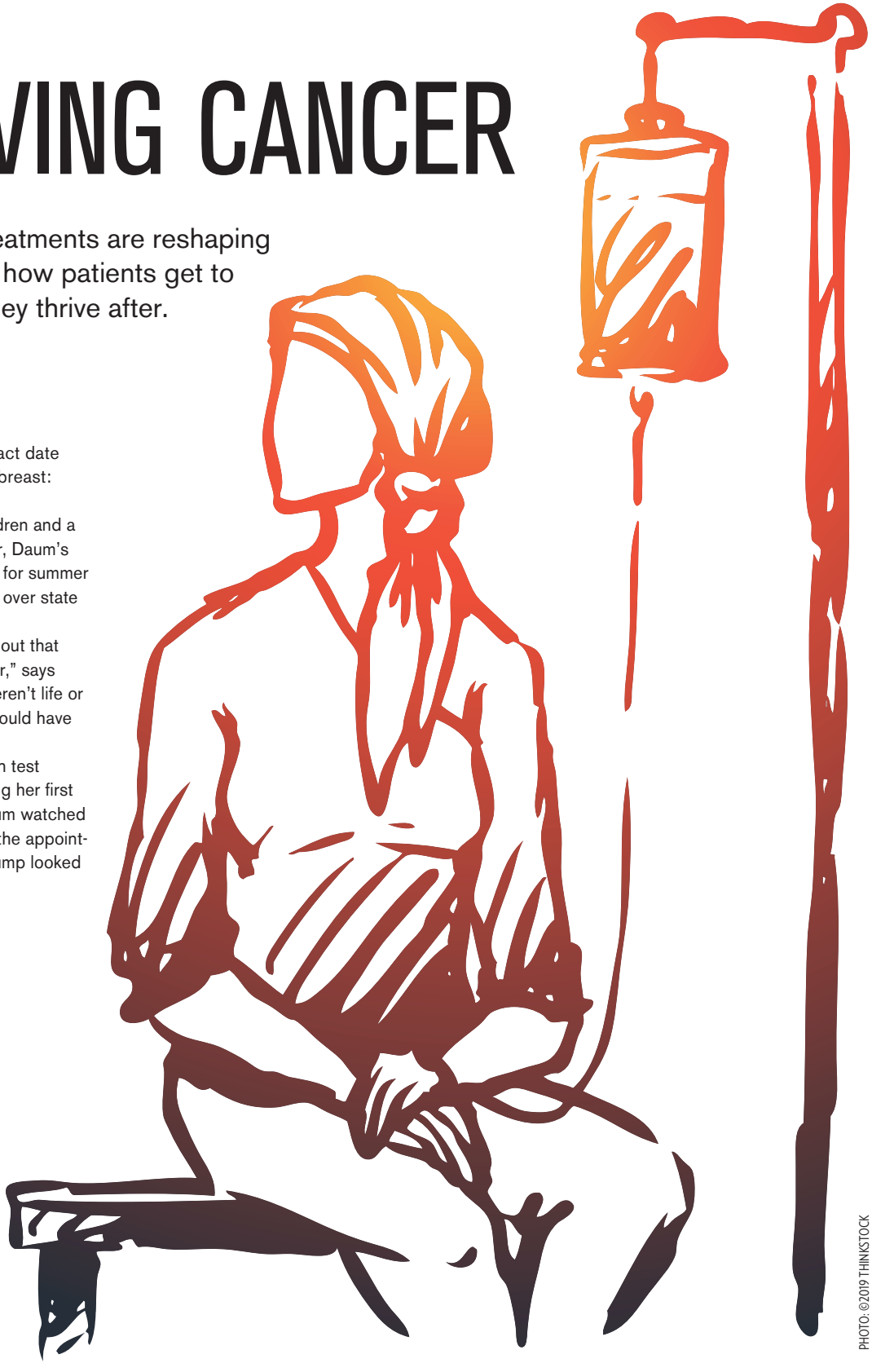

PHOTO: ©2019 THINKSTOCK

SARAH DAUM REMEMBERS the exact date she first felt the lump on her left breast: June 14, 2017.

As a mother of two young children and a Marion elementary school teacher, Daum's day was consumed with planning for summer vacation bible school and fretting over state test results.

"It's funny; I was so worried about that and turns out it didn't really matter," says Daum, now 32. "Those results weren't life or death, and I'd done everything I could have done anyway."

The real potentially life-or-death test results were on the horizon. During her first mammogram and ultrasound, Daum watched her mom, who had joined her for the appointment, receive the news that the lump looked like it might be cancerous.

"I was very calm in that moment. My mom's my best friend. To see how that was affecting her was really hard," Daum says. "My dad was diagnosed with brain cancer and died by the time I was 7. All I could think was, 'How does this feel for my mom, living through this nightmare again? How would I feel if this was my daughter, Reece?' I would be sick on the floor, too."

But this chapter of Daum's story ended differently.

The American Cancer Society estimates that in 2019 there will be more than 1.7 million new cancer cases diagnosed in the United States. Each one of those cases is unique, and for Daum, it was an estrogen-positive ductal carcinoma in situ, caught very early. In September 2017, she had a bilateral mastectomy. Even though the cancer was only found in her left breast, genetic testing showed her to be at increased risk for getting cancer again in the future.

"I just wanted to get rid of all my chances of recurrence," she says. "My husband [Ryan] was like, 'You're beautiful. I'm so glad you're alive. You do what you want to do for your body.'" Since the treatment, "Every shooting pain makes me wonder," she says, "'Is this cancer? Is it back? Can I do this all over again?'"

The death rate from cancer in the U.S. has been on a steady decline since its peak in 1991, according to the ACS, and nearly 2.4 million deaths were averted between then and 2015, thanks in large part to early detection, lower tobacco use and advancements in treatment.

That's where Columbus comes in.

From CAR-T immunotherapy to reproductive health breakthroughs to creating comprehensive programs that help patients like Daum even after the cancer is removed, the city's oncologists, researchers and medical institutions are developing new, life-saving cancer treatments grounded in total patient care.

HARNESSING THE IMMUNE SYSTEM

"It's a very exciting time to be an oncologist," says Dr. Timothy Moore, principal investigator of the Columbus National Cancer Institute (NCI) Community Oncology Research Program and oncologist at The Zangmeister Cancer Center, a division of American Oncology Partners, PA. "There is just an enormous amount of new information and treatments coming out."

Among the most exciting developments are in the area of immunotherapy, which are biological treatments that help a patient's own immune system attack cancer cells.

The Zangmeister Cancer Center, which announced a new partnership with the American Oncology Network in January, saw a 45 percent increase in patients being treated with immunotherapy from 2017 to 2018.

"The concept of immune therapy is fascinating. It destroys the chemicals the cancer produces to hide itself from the immune system," says Dr. Sameh Mikhail, a medical oncologist at the Zangmeister Cancer Center who specializes in blood and cancer disorders and gastrointestinal cancers. "When we use immune therapy, we block the interaction between the proteins the cancer produces and allow the immune system to do all the work."

Some immunotherapies, for example, use modified antibodies to inhibit the proteins certain cancers use to shield themselves from the immune system. Another form of immunotherapy infects the cancer cells with a virus, which then prompts immune system cells to destroy the cancer cells.

Immunotherapy, which uses substances made from living organisms to treat cancer, generally has fewer side effects, Mikhail says, and is better tolerated by patients than standard chemotherapy and radiation treatments. (Indeed, research from 2017 showed that the five-year survival rate quadrupled among patients with non-small cell lung cancer who responded to immunotherapy treatments.)

"It has also allowed me to treat patients that otherwise wouldn't have treatment options," Mikhail says. "There was one patient [with stage IV lung cancer] who, because of her age [82], wouldn't have been eligible for chemotherapy. We treated her with immune therapy, which controlled her cancer for a year and a half until she died of natural causes. It offered her a better quality of life."

CAR-T IN COLUMBUS

Research by Columbus oncologists has been integral to the development of several types of immunotherapy treatments, particularly a breakthrough treatment called CAR-T therapy, which takes a patient's own white blood cells, called T-cells, and genetically engineers them before infusing them back into the patient. These modified cells have receptors that can recognize abnormal proteins on the cancer cells, allowing them to latch onto and destroy the malignant cells.

The Ohio State University Comprehensive Cancer Center – Arthur G. James Cancer Hospital and Richard J. Solove Research Institute helped test and innovate the therapy in clinical trials. That research showed that patients who failed at least two rounds of chemotherapy or stem-cell treatment could respond to the CAR-T treatment–sometimes even putting them in full remission despite the failures of other treatments. The clinical trials also showed how the cellular therapy worked quickly and effectively.

One patient in the trial was a man in his 60s who, seven years after learning he had a slow-growing form of lymphoma, was diagnosed with diffuse large B-cell lymphoma that tested positive for genetic mutations, putting it in the rarest and most aggressive category of the disease. The cancer persisted even after five months of intense chemotherapy, and the patient was qualified for The James' CAR-T therapy clinical trial.

Thirty days after CAR-T therapy cells were injected, he reported the pain was gone. Another 60 days after that, imaging tests showed no sign of disease.

Such patient research and outcomes helped lead to FDA approval of CAR-T therapies, and The James was among the first cancer centers selected to partner with Kite Pharma when the FDA approved

the first CAR-T agent for use in adults with advanced lymphoma.

Today, The James is one of a few institutions authorized to administer both CAR-T therapy drugs Kymriah (for B-cell acute lymphoblastic leukemia) and Yescarta (for certain types of non-Hodgkin's lymphoma). More than 80 percent of patients who received Yescarta in clinical trials experienced either a partial or complete response, according to the Cleveland Clinic, and more than 80 percent of children and young adults treated with Kymriah in clinical trials saw their cancer go into remission.

While initial clinical trials at The James focused on various lymphoma subtypes, new trials will test for forms of T-cell immunotherapy—including multiple immunotherapy-based treatment combinations—in solid tumors, such as cervical and lung cancers and sarcomas.

"We believe that these are going to be really instrumental in the next phase of treating patients with cancer," says hematologist and researcher Dr. Samantha Jaglowski of The James.

LOOKING TOWARD THE FUTURE

To call these treatments game-changing isn't an overstatement.

"There are ways that these immune therapies heal patients like nothing else," says Dr. Dean Lee, director of the Cellular Therapy and Cancer Immunology Program at Nationwide Children's Hospital. Some patients, he adds, have been completely cured of their disease with immune therapies. "We don't have any other cancer therapies that are like that. It just has changed the field. Not only are oncologists excited, but patients, advocacy groups, industry—we're all looking to push this area of investigation."

Nationwide Children's Hospital has been working on more than a dozen new cellular therapy studies in a wide range of areas, Lee says. It infused its first patient with an experimental, commercially manufactured cell therapy in 2017 and, in 2018, infused the first pediatric patient with a cell therapy manufactured in Columbus.

This January, the hospital enrolled its first patient in a clinical trial investigating the application of cellular therapies in patients with neuroblastoma, a cancer most commonly found in the adrenal glands of children. With grant support from the Department of Defense (for the correlative studies) and the St. Baldrick's Foundation, this clinical trial will study the use of "natural killer" cells—white blood cells that can recognize and kill malignant cells—combined with other therapies to treat children with refractory or recurrent neuroblastoma.

"This will be a banner year for opening new treatments," Lee says.

Further ahead, 2021 also promises to be a banner year. That's when Nationwide Children's Hospital, the Ohio State University Wexner Medical Center and The James are slated to open the region's first proton therapy facility to treat cancer.

Proton therapy is a newer, advanced radiation option for treating localized tumors. It is a form of radiation that uses protons instead of X-rays to kill cancerous cells. It can be used alone or in combination with other therapies to treat prostate, brain, head, neck, lung, spine and gastrointestinal cancer in adults, and brain cancer, lymphoma, retinoblastomas and sarcomas in children.

As part of a planned, 340,000-square-foot, outpatient facility on OSU's west campus, the proton therapy center will develop clinical trials that focus on how proton therapy affects specific types of pediatric cancer, while simultaneously offering this state-of-the-art treatment for adult and pediatric cancer patients in one location—opening the door for more Midwestern-based patients to receive treatment quickly and close to home.

THE PATIENT JOURNEY

"Medical facilities in Columbus have been early adopters of most of the newer treatments, especially personalized treatments," Mikhail says. "The mindset of oncologists has changed over the years. In the past, the focus used to be on outcomes, but what we do well in Columbus is focus on quality of life and try to pick a cancer treatment that reduces significant side effects."

Numerous radiation treatment advances have helped make this possible: The benefit of proton therapy is that it can hit a concentrated area of cancerous tissue while sparing the tissue around it, which could be damaged with toxicity otherwise, thus affecting a patient's long-term quality of life. Intensity-modulated radiation therapy targets the radiation directly at the tumor, reducing side effects and providing a more focused dose. Breast cancer advances include a newer procedure that delivers a

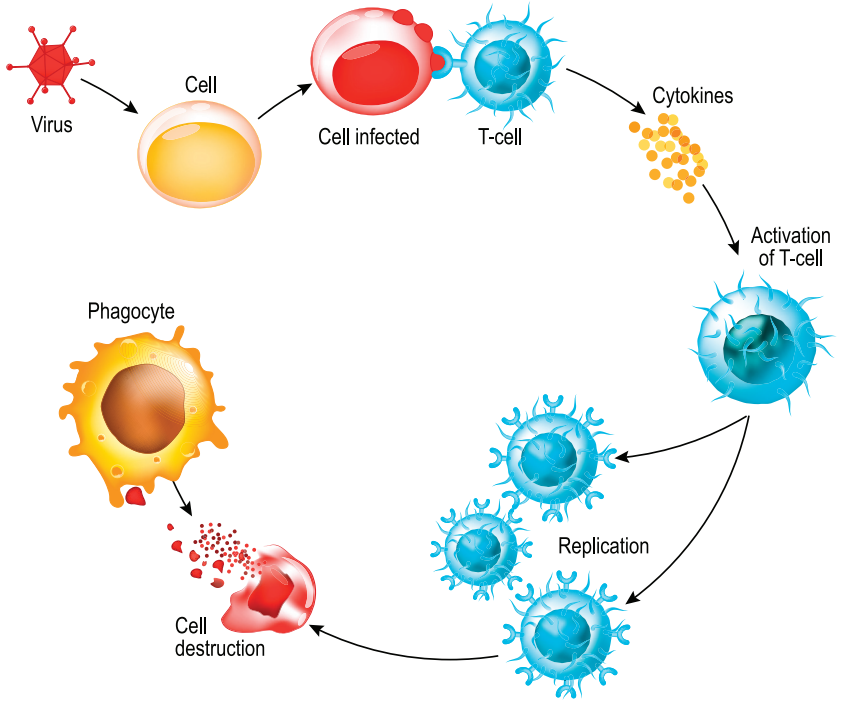

PHOTO: ©2019 THINKSTOCK

high dose of radiation during a lumpectomy surgery right where the tumor was located, saving patients weeks of post-surgery radiation treatments.

A current trial by OhioHeath and the MD Anderson Cancer Center is studying partial breast radiation therapy, which "treats less tissue and more quickly," says Dr. Praveen Dubey, a radiation oncologist and vice president of OhioHealth's cancer program. "We believe that patients in this trial will derive less toxicity and shorter travel time for treatment."

Reducing side effects also means predicting relapses and best paths forward in an individual's recovery. Columbus clinicians are using a new technique that analyzes a patient's genetic makeup to determine how likely they are to get cancer in the future and how they might respond to different treatments.

At OhioHealth, where more than 100 active clinical cancer trials are ongoing with its partners at MD Anderson and the NCI Community Oncology Research Program (NCORP), a national trial is exploring whether aspirin, known for reducing inflammation, could deter breast cancer relapses.

> "A multidisciplinary approach is absolutely necessary in cancer care. It's a complex disease that requires a coordination of elements."
>
> –Dr. Praveen Dubey, OhioHealth radition oncologist

As cancer survival rates rise, the focus on quality of life will continue to rise, too. The James' new Fertility Preservation and Reproductive Health Program, led by Dr. Leslie Appiah, offers reproductive options for young cancer patients, including use of random start protocols that allow eggs to be stimulated and extracted for storage at any time during a woman's menstrual cycle. OhioHealth offers an Integrative Cancer Care Program, a supportive service that helps patients and survivors restore their sense of well-being after cancer through acupuncture, nutrition counseling, art and massage therapies and more.

"A multidisciplinary approach is absolutely necessary in cancer care. It's a complex disease that requires a coordination of elements," Dubey says. "Everybody has to really work together to formulate a proper treatment plan. Having everybody in the room at the same time makes certain all decisions we make for a treatment plan consider all aspects of their care. The issue in oncology is twofold: We want to deliver the most effective, least toxic treatment we can, without compromising the outcome."

For breast cancer survivor Sarah Daum, experiencing a high quality of life post-cancer includes paying forward the support she received from other survivors. Particularly meaningful were contacts The James' Stefanie Spielman Comprehensive Breast Center offered her; these women had undergone different types of breast reconstruction surgeries–surgeries that Daum had to choose from–and they were willing to talk about their firsthand experiences, recoveries and decisions.

"Being able to talk to women who had been through those surgeries was one of the most helpful things I did," Daum says. After her own breast implant procedure last April, "I said, 'If you ever have women interested in the surgery, they definitely can call me.' I am almost excited to do it, because it was so helpful for me. Those women I talked to eased my concerns about things. They reminded me, 'You are not alone.'"