

A
REMARKABLE
THING HAPPENED...



Penn Medicine



Thanks to Carl June's Penn team of researchers and Stephan Grupp, MD, PhD, her treating physician at Children's Hospital of Philadelphia, and lead investigator on the pediatric trial, Emily Whitehead remains cancer-free after receiving an investigational cellular therapy that used her own T cells to hunt down and kill her acute lymphoblastic leukemia.

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CALM AFTER THE
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CARL H. JUNE, MD

**Richard W. Vague Professor in Immunotherapy
and Director of the Center for Cellular Immunotherapies**

From Fire with Fire (2012), a film directed by Ross Kauffman

THE
BREAKTHROUGH
HAS ARRIVED.

ANOTHER HISTORIC
REVOLUTION
HAS STARTED
IN PHILADELPHIA.

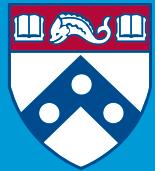


Penn Medicine | Smilow Research Center

AND IT'S HAPPENING AT

PENN

WORLD LEADER
IN IMMUNOTHERAPY





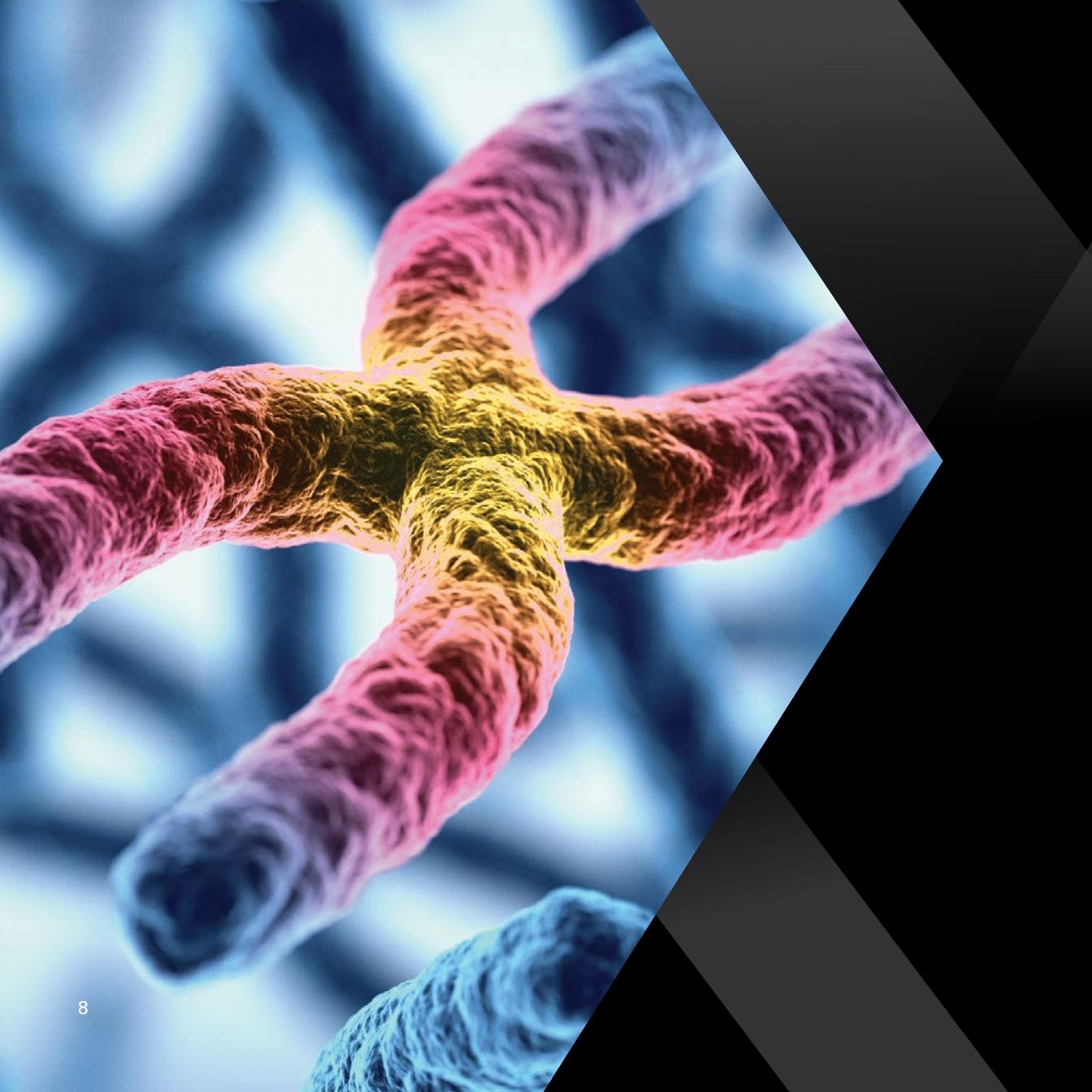
REVOLUTIONARIES IN INNOVATION

As the world's leaders in immunotherapy, Penn physicians are imagining the day when they can offer more successful, less toxic cancer treatments.

Immunotherapy is now a powerful addition to Penn's cancer-fighting arsenal of surgery, targeted therapies, and precision radiation treatments. Penn's researchers are working relentlessly to realize the full potential of this innovative approach: reprogramming the body's own immune cells, such as T cells, to seek and destroy every last cancer cell.

Using state-of-the-art technologies like gene therapy, monoclonal antibodies, and T cell engineering, Penn's immunotherapy research efforts include:

- Cancer vaccines
- Checkpoint inhibitors
- Combination therapies
- Cell-based therapies



PRACTICAL ADVANTAGE

Our success in clinical trials in leukemia has led to a comprehensive model, unique to Penn, that will allow us to launch a creative assault on many types of cancer and other immune-related diseases. The few other hospitals using immunotherapy have research programs that focus on only certain cancers, with a small number of patients enrolled in trials.

Penn's hope is to establish the safety and efficacy of immunotherapy—and, some day, determine if it is more effective and less toxic than traditional cancer treatments.

Current Research:

- Breast cancer
- Glioblastoma and brain cancers
- Ovarian cancer
- Melanoma
- Myeloma and other hematologic malignancies
- Pancreatic cancer

Future Short-Term Goals:

- Additional solid tumor cancers
- HIV
- Multiple sclerosis
- Alzheimer's disease
- Gastrointestinal disorders
- Hepatitis C
- Transplantation
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FULFILLING THE PROMISE

“ *Suddenly there was new hope and a way to fight.* ”
DOUG OLSON



For 20 years, Doug Olson lived with an enemy determined to take his life: chronic lymphocytic leukemia, or CLL, a cancer that starts in the bone marrow. Over 14 years, Doug endured four rounds of conventional chemotherapy to control his CLL. But the cancer was relentless and progressing. His oncologist—David Porter, MD, Director of Blood and Marrow Transplantation at Penn Medicine and one of the nation’s top oncologists—suggested something revolutionary.

Dr. Porter, one of the immunotherapy pioneers and leaders at Penn, believed that Doug was an excellent candidate for a research study that harnessed the immune system to fight leukemia. Doug's T cells were removed from his blood and genetically reprogrammed to destroy his cancer cells.

Less than one month after Doug's infusion of reprogrammed T cells, Dr. Porter had the honor of giving Doug news he had been waiting to hear for 14 years: "Doug, we can't find a single cancer cell in your body. Not in your bone marrow. Not in your blood. Not anywhere."

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Our results represent two decades of investment and perseverance in our effort to find an entirely new way to treat cancer. With the proper funding in place, we will have the opportunity to accelerate this vital research—and treat more patients.”

DAVID L. PORTER, MD

“ *I am so lucky ... I was at the right place, at the right time, with the right people. And that is why I am still here today.* **”**

SARA BRUBAKER



On a Wednesday, Sara Brubaker realized that she was struggling to read. The lifelong educator assumed this sudden difficulty was stress related. But that Friday, she learned she had glioblastoma: a very serious brain cancer. After other conventional therapies, Sara’s cancer continued to progress. She came to Penn Medicine’s Abramson Cancer Center and became the sixth patient on the recurrent glioblastoma T cell therapy trial. Early results suggest that the investigational approach has been safely tolerated. Next steps include proving its effectiveness for patients facing brain tumors.



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There has never been a more exciting time to be a physician—or a time of more rapid development of innovative and effective therapies. We are focused on expanding our research into evaluating immunotherapy for solid tumors so we can provide new hope to our brave patients, who are making history with their treatments.

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DONALD M. O'ROURKE, MD

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Thanks to our strong alliance with Penn Vet, right now we're able to conduct next-generation T cell therapy clinical trials to treat pet dogs suffering from cancer—plus, the information we're learning may someday have applications for humans as well. Penn is a leader in this kind of translational research, and I'm proud we can help to win the battle against cancer for every member of the family.

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AVERY D. POSEY, PhD



- About 90% of pediatric patients with acute lymphoblastic leukemia have responded to T cell therapy.
- Personalized cellular therapy trials in non-Hodgkin lymphoma; multiple myeloma; brain, breast, and lung cancers; and melanoma are in various stages of development, with more cancer types in the pipeline.
- For example, 10 patients have been enrolled in Penn's recurrent glioblastoma T cell therapy trial, many of whom were out of options and in need of hope.
- It was at Penn Vet that researchers uncovered common traits in tumors between dogs and humans. Now they may be able to use this knowledge to evaluate therapies for cancer's early stages in dogs and fast-track the most promising treatments into the human clinic.



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Emily, Doug, and Sara were the first patients who joined us at the front line of this new fight against cancer. Penn now has more than 250 clinical trials available in cancer—with 1,700 patients participating. To date, we have treated more than 400 patients in clinical trials of personalized T cell therapies—and we are eager to expand these numbers nationally and globally.

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Penn has empowered clinician-scientists of all disciplines to harness the potential of the immune system to attack disease. The opportunities for research and clinical trials in breast cancer, solid tumor cancers, and other diseases are exciting. I am inspired by my colleagues and invigorated by the collaborative, comprehensive force in immunology at Penn.

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PENN IMMUNOTHERAPY MILESTONES

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- Madlyn and Leonard Abramson made their landmark gift to launch the Abramson Family Cancer Research Institute, allowing Penn to recruit Carl June, MD, and create its first vaccine production facility

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Drs. David Porter,
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PEOPLE

For more than two decades, Dr. Carl June and the Penn team sought a breakthrough approach to treating cancer. Their success electrified the world. And they are just getting started.



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Carl H. June, MD

Led the Penn team that developed the revolutionary chimeric antigen receptor (CAR) T cell therapy, which is showing unprecedented promise in the treatment of blood cancers in both children and adults

From HIV to cancer and other diseases, we have multiple promising ideas that are awaiting the resources to bring them to life. Our own work on T cells relied on private philanthropy to get off the ground. Without it, we wouldn't have been able to design the treatment that put so many patients' cancer into remission.

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What makes Penn Medicine stand out is human immune analysis, where clinical trials go ‘back to the bench.’ That means we can learn more from our studies to make the next generation of trials even more successful and with fewer side effects—providing the pathway to finding innovative treatments for humanity’s most challenging diseases.

”

Robert H. Vonderheide, MD, DPhil

Leads innovative clinical trials harnessing multiple immunotherapy approaches to fight a variety of cancers, including pancreatic, at Penn’s Abramson Cancer Center



“

Patients and researchers alike are now turning to us as a source of hope, inspiration, and direction. That's because Penn has the nation's pioneers in immunotherapy. We have more faculty working together in more diseases, and working longer in this rapidly growing field, than virtually any other institution.

”

E. John Wherry, PhD

Leads the multidisciplinary efforts in immunology research across Penn, and is one of the most highly cited scientists in the nation.

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I moved halfway across the country to work at Penn because its infrastructure is premier among academic institutions for the development of cellular therapies such as our personalized vaccines. And the Penn faculty's expertise in cancer and immunology, and their strengths in translating research into the clinic, presents a fertile ground for the cross-pollination of ideas and therapeutic approaches.

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Photographs generously provided by The Emily Whitehead Foundation © All Rights Reserved

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It's almost impossible to imagine that when Emily was first treated using immunotherapy, her bravery would inspire people like Bradley Cooper and Sean Parker to join our fight against cancer. We are thrilled that so many prominent figures are looking to Penn to lead the way—so that every cancer patient and their loved ones have new hope for an end to this disease.

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TOM WHITEHEAD



Emily Whitehead's cancer-free journey continues, celebrating at an evening gala at philanthropist Sean Parker's home with her parents and a new fan: Bradley Cooper.

IS THERE A MORE WORTHY CAUSE FOR INVESTMENT?
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We invite your further inquiry.

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215.898.1033 | immunorev@upenn.edu



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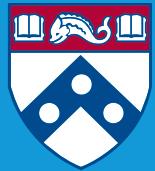
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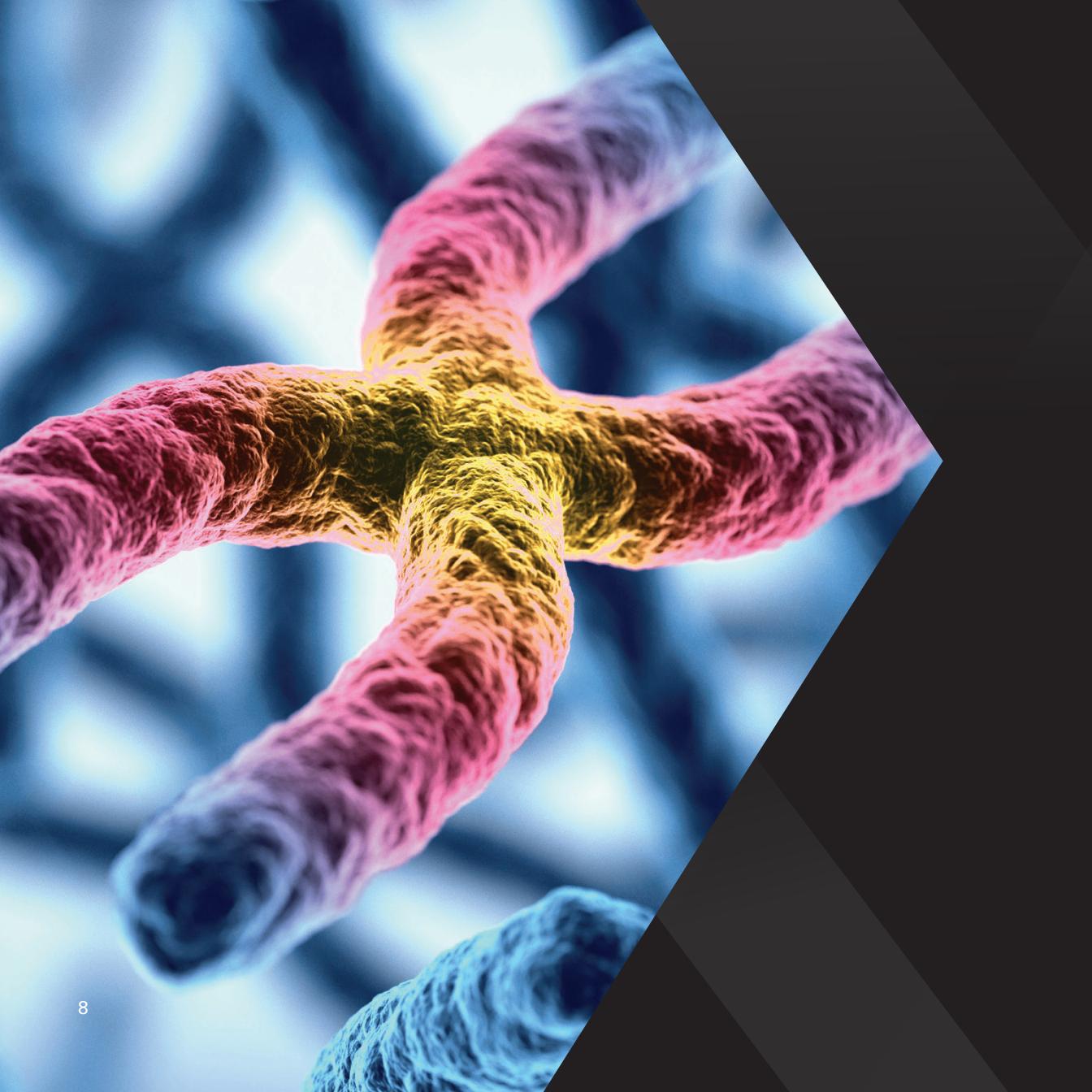
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