

# From ‘the call’ to the cure

## Fueled by personal loss, one scientist is changing how we fight cancer — for everyone

By Penny Walker, ASU News  
August 22, 2025

**Editor's note:** This story was featured in the [fall 2025 issue of ASU Thrive](#).

**By Sara Clemence**

When Joshua LaBaer finished medical school, he was sure of two things: Cardiology didn't appeal to him, and he wasn't going to specialize in oncology. But doing rotations with cancer patients during his internship and residency at Brigham and Women's Hospital in Boston changed his mind.

"It was both intellectually and emotionally very rewarding," says LaBaer, now the executive director of Biodesign Institute at Arizona State University.

"You have to know everything about medicine to be a good cancer doctor, but also the patients are wonderful, and it's a field where you really bond with them."

When LaBaer's mother was diagnosed with breast cancer, the work took on a new kind of urgency. By then, he was leading a lab at Harvard focused on early detection of cancer through the analysis of proteins. Suddenly, the science became deeply personal.

"It was a mixed blessing," he says. "I could speak the language. I could help. But I also knew too much."

His mother died of the disease. But her case — and how it might have played out differently — remains a guiding force in his work.

Much of LaBaer's research is devoted to breast cancer. One of his team's most promising technologies is a blood test that detects immune responses to early-stage disease. If such a test had existed then, LaBaer wonders, would it have made a difference?

He'll never know the answer. But it's a question that still drives him.

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### Learn more

Explore cancer research at ASU at [biodesign.asu.edu/research-areas/cancer](https://biodesign.asu.edu/research-areas/cancer).

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### Lab as launchpad

The Biodesign Institute is a multidisciplinary powerhouse with 16 research centers that focus on everything from mitochondrial medicine to how cells evolve. It's also the heart of ASU's cancer research efforts.

LaBaer's lab is a launchpad for promising technologies and budding researchers. Among them is Lydia Sakala, '18 BS in biochemistry, who is originally from Zambia. She came to ASU with an interest in HIV — a pressing issue in her home community — and pursued undergraduate studies in biochemistry. After a brief stint shadowing doctors in an emergency room, she returned to ASU to pursue doctoral research.

At the start of the pandemic, LaBaer quickly marshaled resources, turning capabilities developed through a research project in which PCR tests were used into one that [created and processed saliva tests for COVID-19](#).

Sakala initially applied to help conduct COVID-19 research in LaBaer's lab. Then she took LaBaer's Biochemistry of Cancer course and began to understand the magnitude and urgency of the problem.

"The more I learned about cancer, the clearer it became that better treatments were needed. Now, I'm grateful to play a small role in this massive undertaking," Sakala says.

Sakala now investigates mutations in a key protein known as P53, one that's implicated in the vast majority of triple-negative breast cancer cases, an especially aggressive and hard-to-treat subtype of the disease. Her work is part of a broader effort to understand how specific mutations influence cancer behavior, and ultimately, to help guide the development of more effective treatments.

Fellow doctoral student Lilian Chinonso Nwachukwu, who will graduate with her PhD in biochemistry in 2026, was propelled toward breast cancer research at 16, when a close friend's mother died from the disease.

"It was really devastating," she says. "We were pretty young at the time, and she was like an auntie for me."

Her research also focuses on triple-negative breast cancer, named because it lacks the biological markers needed for common hormone therapies. Using tools including CRISPR and gene expression analysis, Nwachukwu studies how mutations can be exploited for more personalized therapies. It's part of a broader push within the Biodesign Institute to move from one-size-fits-all treatments toward solutions rooted in the biology of individual patients.

"A lot of good things have been done," Nwachukwu says. "But there are still gaps that I and other people could help fill in the future."

## **Affected by cancer**

LaBaer refers to it as "the phone call." Countless people have received it from someone they love who is diagnosed with cancer.

The call came for him when he was around 30. His mother's doctors had found a concerning lesion in a routine mammogram.

By then, the cancer had spread to her lymph nodes. She underwent surgery and high-dose chemotherapy.

LaBaer believes her body was cleared of cancer, but not her brain. The tumor that eventually developed there killed her when she was 64.

Several years ago, LaBaer gave a TEDx talk in which he showed a slide of progress on diseases since 1950. Deaths from heart disease, stroke, pneumonia and the flu had plummeted, while cancer mortality stayed roughly the same.

Despite that data, he said, he was optimistic. Over the course of his career, cancer science had gone from a cellular understanding of cancer to investigating it on a molecular level.

LaBaer's early fascination was to add to the collective knowledge of science — to explore where no one had yet looked. He grew up in the Phoenix area and went to high school at Washington High on Glendale Avenue, then started college at UC Berkeley with a plan to become a lawyer or a doctor. He eventually ended up in an organic chemistry class.

Unlike the regular “orgo” class, where students worked on recipe-like experiments, LaBaer's was an honors course. Students took on multistage syntheses whose outcomes were uncertain.

“I thought, ‘Whoa, we’re going to be the first ones to do something,’” LaBaer recalls. “That bug bit me hard.”

He soon realized he didn't have to choose between research and medicine; he could do both.

## Earlier detection

LaBaer and his team are now doing pioneering work on a diagnostic approach rooted in the immune system's own record-keeping. A person's blood contains antibodies that form a record of all of the body's past immune responses. Their protein microarrays innovation can analyze thousands of immune responses in a single drop of blood — essentially reading the body's history of disease and potentially detecting traces of cancer before symptoms appear.

“The immune system logs everything,” he explains. “Infections, cancers, autoimmune diseases. If we can read that log, we can detect disease early. Maybe even prevent it.”

His lab recently conducted a 12,000-sample study analyzing immune markers in infectious disease and cancer, potentially enabling earlier, more precise detection.

The team has also identified a series of antibodies that could be useful in detecting breast cancer. A blood panel based on those antibodies came achingly close to commercial release

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## Pairing up to treat cancer

Recently ASU's Biodesign Institute partnered with Dublin City University's Biodesign Europe to develop new therapies for aggressive breast cancer.

ASU's Mehdi Nikkhah and Jin Park will use their 3D “tumor-on-chip” models to study how specific mutations in the TP53 gene drive treatment resistance in triple-negative breast cancer. The Dublin team will investigate how these mutations interfere with calcium-based cell death.

The research aims to develop more effective therapies for not only breast cancer but also many other cancers driven by TP53 mutations.

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before the startup behind it ran out of funding. Now, it's back in ASU's hands, and LaBaer's team is working to get it into the right ones.

In the meantime, he still thinks about his mother's cancer regularly.

"I still do wonder," LaBaer says. "When she had that first mammogram, if they had done a blood test, would they have been more suspicious? Would they have looked a little harder? And if they found it back then before it spread to her lymph nodes and all the rest of that stuff, could she have had a different outcome?"

While there's no way to know, some day, because of the work at ASU, the outcome might be different for someone else's mother, friend or child.

For those driven by loss and hope alike, the work is more than discovery. It's a promise to keep looking, and to keep going.

"I love this work," LaBaer says. "There's nothing more fun than shedding light where there isn't any right now."

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## About the writer

A reporter and former travel editor for The Wall Street Journal, previously, Sara Clemence was the news director for Travel + Leisure and deputy business editor for the New York Post.

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*This story originally appeared on [ASU News](#).*

## Main image



Lilian Chinonso Nwachukwu, graduate research assistant at the Virginia G. Piper Center for Personalized Diagnostics, and Dr. Joshua LaBaer, executive director of the Biodesign Institute at ASU. Both have lost loved ones to cancer, adding poignancy to their research. Photo by Jeff Newton

**Text image(s)**



Lydia Sakala, '18 BS in biochemistry, works as a graduate service assistant at the Virginia G. Piper Center for Personalized Diagnostics. "The more I learned about cancer, the clearer it became that better treatments were needed. Now, I'm grateful to play a small role in this massive undertaking," Sakala says. Photo by Jeff Newton





Josh LaBaer and a photo of his late mother, who died of cancer. A doctor who was leading a lab at Harvard focused on early detection of cancer at the time of his mother's diagnosis, he says, "I could speak the language. I could help. But I also knew too much."