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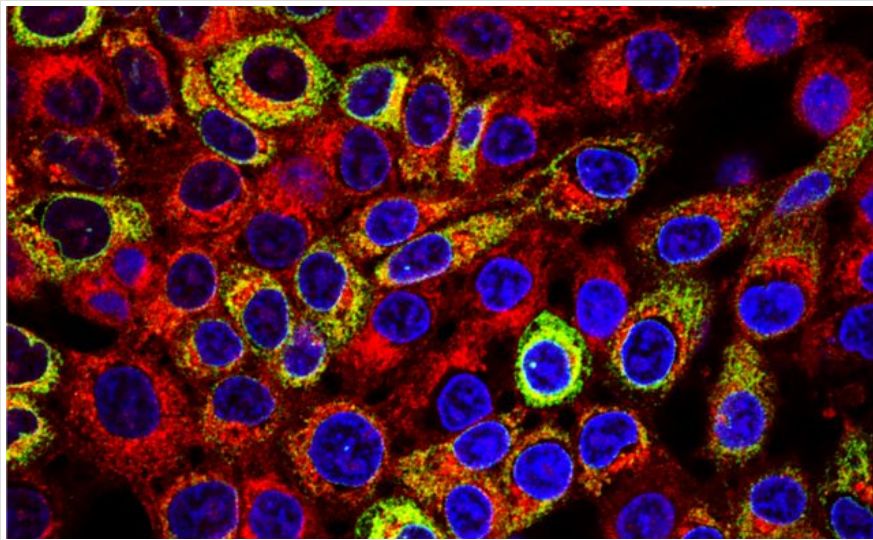
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## Study of How Cancers Spread Promises Treatment Options

American Cancer Society funds UM professor's breast cancer research

DECEMBER 15, 2021 BY SHEA STEWART



In this image, cancer cells are being used to test investigational new drugs. The green is staining a target in the cells that causes cancer cells to grow and the drug being delivered to the cancer cells shows up as red. Blue is the nucleus of the cells. Submitted photo

OXFORD, Miss. – A **University of Mississippi** biomedical engineer is searching for new treatments for metastatic breast cancer using a nearly \$800,000 grant from the **American Cancer Society**.

Thomas Werfel, assistant professor of biomedical engineering, is exploring the interaction of blood platelets and tumor cells to discover how to disrupt the metastasis of triple-negative breast cancers. **This type of cancer** spreads faster, is deadlier than other invasive breast cancers and accounts for about 15% of all breast cancers.

"Cancers become deadly when they spread," said Werfel, who also serves as an affiliate assistant professor of chemical engineering and joint assistant professor of biomolecular sciences. "That's really the kind of cancer that kills people.



Thomas Werfel, assistant professor of biomedical engineering, is searching for new treatments for metastatic breast cancer using a nearly \$800,000 grant from the American Cancer Society. Submitted photo

state-of-the-art medical care to cancer patients, and offer up-to-date cancer training to medical and research students and information to those who live in Mississippi.

### An Engineering Approach

Cancer is the second most common cause of death in the U.S., trailing only heart disease. The **American Cancer Society estimates** that almost 1.9 million new cancer cases will be diagnosed in

"And when they spread, the blood is one of the most common routes, so this grant is all about how the cancers interact with the blood as they're spreading and how blood components protect them as they spread to new areas."

Besides his work in the schools of Engineering and Pharmacy, Werfel also is a member of the research team at the UM Medical Center's Cancer Center and Research Institute. The CCRI links cancer researchers, physicians and staff across the state in a united effort to find better ways to prevent, detect and treat cancer, provide

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OXFORD, Miss. – Eleven University of Mississippi students spent their winter break learning about the people who work behind the scenes of the American government in Washington, D.C. Lead by Jonathan Klingler, assistant professor of political science, the students of Pol 391: Applied Politics met not with candidates, but with the people who make candidates'

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OXFORD, Miss. – Stephanie Jennings Teague, of Chicago, sees her commitment of \$100,000 to the Patterson School of Accountancy's new building at the University of Mississippi as a means of saying "thank you." "It is a way to show a small token of my appreciation to Ole Miss, the faculty and staff, and the accounting

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#### Reuters: Keep an Eye on the Money Supply

U.S. inflation roller coaster prompts fresh look at long-ignored money supply By Michael S. Derby NEW YORK – The amount of money sloshing around the U.S. economy shrank last year for the first time on record, a development that some economists believe bolsters the case for U.S. inflation pressures continuing to abate. The Federal Reserve's

2021, including almost 19,000 in Mississippi, and more than 608,000 Americans are expected to die of cancer this year.

Of those diagnoses and deaths in 2021, 284,200 of the estimated new cases were expected to be diagnosed as breast cancer, with 44,130 of the deaths expected to be related to the cancer.

"I'm just incredibly excited to kick off this project and to be associated with a group that's had such a positive impact as the American Cancer Society is really exciting," Werfel said. "Triple-negative breast cancers are incredibly aggressive, and they're incredibly hard to treat because the chemotherapy is not working very well in these patients."

"So these cancers are rapidly spreading and there are basically no treatment options. We don't have another drug that we can go try out in those patients, so better treatments specifically for triple-negative breast cancer patients could be transformative."

Exploring breast cancer and its spread from a biomedical engineering viewpoint offers new perspectives, Werfel said.

"You can take an engineering approach to look at the problem in a unique way, and then be able to see what you learned, take what you learned and try to address the medical needs," he said. "We're merging engineering and medicine where we start from a medical problem and then we have a unique toolbox that we can use to address those problems."

"I think that's the way it works best. Find a problem; develop a unique solution to that problem; see how well it works."

The research is an extension of work Werfel started as a postdoctoral fellow at Vanderbilt University School of Medicine. A native of Waverly, Tennessee, he earned his bachelor's degree in physics from Murray State University and his master's and doctorate in biomedical engineering from Vanderbilt.

He [joined the Ole Miss faculty in 2018](#).

"Thomas is a rising star who is setting the pace for the [Department of Biomedical Engineering](#) and the [School of Engineering](#)," said David Puleo, UM engineering dean and professor of biomedical engineering.

"Not only does this type of external funding validate the outstanding research being conducted in the department, but it also allows our investigators to address significant challenges in human health. In this case, we're pleased to see the American Cancer Society recognize Thomas' creative approach to addressing a critical issue that many of us are, unfortunately, all too familiar with – the spread of cancer."

### Investigating Metastasis

Metastasis is the invasive process by which cancers spread from their local source to other regions of the body, and once a cancer is diagnosed as metastatic, it becomes a disease that can be managed but is no longer curable by current treatments.

These kinds of cancers account for essentially all cancer-related deaths.

Evidence supports that these cancer cells are shuttled through the body to other areas such as the lungs, liver, brain and bones with the help of blood platelets, which also are involved in clotting.

"If you think of the tumor cells as the quarterback, then the platelets are the offensive line," Werfel said. "If we can knock out the offensive line, then we think that we can take out the quarterback more easily."

Werfel's research is focused on a receptor that promotes cancer metastasis through blood platelets and tumor cells interacting. The outcome of the research could provide a new treatment to metastatic triple-negative breast cancer patients who are currently out of options.

"We don't know a ton about the exact mechanisms for how the platelets interact with the tumor cells," Werfel said. "How do they aggregate? Once the tumor cells attach to the platelets, how do those behave differently? How does that change the signaling

inside the cell?

"These types of questions are things that we'd like to learn more about because we think this might be a promising therapy that, as a bonus, is very easy to take."

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Larry Stokes, a former undergraduate member of the Interdisciplinary NanoBioSciences Lab at the University of Mississippi, runs a flow cytometry analysis on cells being used in the lab. Submitted photo



Thomas Werfel (right) and his team from the Interdisciplinary NanoBioSciences Lab, hang out in the Grove. Submitted photo

At UM, Werfel oversees the **Interdisciplinary NanoBioSciences Lab**, which uses materials chemistry, bioengineering and the biological sciences to discover and apply next-generation therapies such as targeted cancer therapies, environmentally-responsive drug delivery systems and new solutions for mental health disorders.

The lab also employs several postdoctoral research associates and graduate and undergraduate students in its work, including the research tied to the American Cancer Society grant.

“It’s good to get students involved and get them some experience,” Werfel said. “It’s great, particularly, to give undergraduate students a little bit of exposure to research early on.

“It gives them a chance to get their hands dirty and see what they’re learning all this stuff for. It can change their trajectory.”

Titled “Determining the contribution of TPr to platelet-mediated cancer metastasis,” the grant from the American Cancer Society

is funded for \$792,000 for four years.

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