

## Biology students' original mRNA research could one day help stop cancer

Imagine a complex system of gears—each wheel turning with interlocking teeth. Throw in a wrench, and everything stops.

Dr. Arnab Sengupta, an assistant professor of cell and molecular biology, mulls over that scenario every day.

Only, in his case, the wheels are cells and the wrench, stress.

If Sengupta and his team of undergraduate researchers can learn enough about cells and what causes them to shut down or keep producing, they could someday help stop cancer.

Cancer is a complex disease, not one any single scientist or lab can conquer. But Sengupta leans on his expertise in ribosome function to lead students in answering one particular aspect of the puzzle: how cells switch on or off.

Sengupta started at Georgia College & State University in January 2022. He was drawn here because of the university's new Integrated Science Complex and the beauty of a public liberal arts education—where undergraduate research is valued, and he could continue to explore topics that interest him, like mRNA (messenger ribonucleic acid).

Some cancer genes are switched on or off at the stage when genetic information in mRNA is read to make proteins. In stressful conditions, cancer genes defy orders to stop functioning. They act as rebels—ignoring environmental triggers.

If researchers understood how some mRNAs

are controlled under stress, they could someday turn off cancer-causing genes and turn on cancer-fighting genes.

"I'm interested in a couple of these mRNAs that, under stressful conditions, still want to translate into proteins. They are the ones that tend to enable cancers," Sengupta said. "My fascination centers on how the mRNA is doing it, not cancer genes in particular. This research could have a big impact. That is what drives me."

He thinks the answer may lie in the way mRNA folds upon itself.

DNA (deoxyribonucleic acid) has two long strands, arranged like a twisted ladder, which support its structure. RNA has one strand and folds upon itself. Because of this, it can adopt a variety of shapes.

"At this point, I just want to know how they're doing it!" he said, excitedly. "How are you defying these orders when you're being told not to make proteins? How are you still going on and figuring out a way to do that? How are you defying the instructions? That is fascinating to me."

Sengupta recruited four students in his lab to help unravel the mystery.

Their goal is to map folding patterns of certain mRNAs and build a structural model.

To do this, they first extract RNA in test tubes. They'll compare those results to live-functioning cellular RNA and, finally, to cellular RNA under stress.

Each student in Sengupta's lab is tasked with researching a different gene related to cancer.

Jin Yeong Kim of Milledgeville is a senior biology major with a pre-med concentration and minor in philosophy. It's her job to study p53, a tumor-suppressor gene. She's trying to understand how mRNA is read to make the p53 protein.

"Sometimes the results are not what we're expecting," Kim said, "but Dr. Sengupta's great. This research is so above my level as an undergraduate student. It's Ph.D. level, but he's able to explain it in a way I truly understand, which makes the work more engaging and interesting."

Junior biology major Alexandra Furney of Johns Creek, Georgia, is getting a minor in Spanish. She's working on a gene called Hypoxia-Inducible Factor (HIF)-1a. Under stressful low-oxygen levels, HIF-1a doesn't shut down. It's triggered to make more protein.

Another student in Sengupta's lab, junior Brittany Benner of Albany, Georgia, is a biology major with a pre-med concentration. Her piece of the research is studying an mRNA gene called fibroblast growth factor 2—which is essential for all cells to grow.

Cancer cells use this gene to stimulate tumor formation and reproduce.

"If we can figure out more," Benner said, "we can better describe that type of cancer."



Below: Jin Yeong Kim works in the mRNA lab at Georgia College & State University.



## Rear Admiral visits GCSU for Atlanta Navy Week

In November, United States Navy Rear Admiral Alvin Holsey embarked upon a tour of inland communities to ensure all Georgians understand the importance of the Navy to American peace and prosperity. As a part of Atlanta Navy Week, Rear Adm. Holsey stopped at Georgia College & State University to renew a relationship that started with Milledgeville's long-time Congressional representative, the late Carl Vinson.

Holsey is the former commander of the Carrier Strike Group One, embarked aboard the USS Carl Vinson, a Nimitz-class nuclear supercarrier named after Vinson. In addition to drumming up support for the Navy, Holsey took time to learn more about the namesake of one of the ships that fell under his command.

Vinson represented Baldwin County for 50 years in the U.S. House of Representatives. His tenure is celebrated for his staunch support of the armed services and his strong advocacy for the development of a two-oceans navy.

"When you learn the history of your ship and



Rear Admiral Alvin Holsey with GCSU President Cathy Cox.

the culture surrounding the ship, it forms a natural connection," Holsey said. "It's so powerful to have organizations like [Georgia College] to reach out and sow those seeds. I've never been here, but I understand the power of this visit, the power of hearing these stories and the power of connecting with community. So, I would encour-

age that to continue to happen."

Georgia College is home to Vinson's papers in the Ina Dillard Russell Library; custodian of the congressman's former residence, the Carl Vinson House; and an educational partner, formerly providing satellite classes to sailors serving aboard the USS Carl Vinson.

Holsey said those kinds of connections help build a support network for the men and women serving in the Navy. The history permeates the culture, and sailors are better able to connect their duties back to the people and communities they're protecting through military service.

"To my mind, leadership is about empathy, development, compassion and promise—the promise to see not just who a person is today, but who they can be tomorrow, who, as leaders, we can help them to become," Holsey said. "If you have that as the underlying tone, it sets the stage so that as we face down bad actors around the world, we face them as a team."

## Did you know?

The Office of Inclusive Excellence will present Diversity Toolkit: Discussing Identity, Power and Privilege. The program will be held Wednesday, November 16 at 12 p.m. It is the last installment of OIE's Diversity 360 Series for the semester.

Developed by the USC Suzanne Dworak-Peck School of Social Work, this toolkit is meant for anyone who feels there is a lack of productive discourse around issues of diversity and the role of identity in social relationships, both on a micro (individual) and macro (communal) level. Perhaps you are a teacher, youth group facilitator, student affairs personnel or manage a team that works with an underserved population. Training of this kind can provide historical context about the politics of identity and the dynamics of power and privilege or help build greater self-awareness. This workshop is designed to address human issues that everyone faces and help participants recognize how they can better understand these issues. For information, call (478) 445-4233.

## International graduate student pursuing his dream at GCSU

Graduate student Abbas Fares of Lübbecke, Germany, who's originally from Lebanon, is pursuing his dream to teach English and physical education at a vocational college. While here, he's making connections and working on his vocabulary.

Before coming to Georgia College & State University (GCSU), Fares got a taste of America on a visit with his aunt in New York City. Because of the pandemic and online courses, he felt that his English skills had been floundering. That's when he decided to perfect his English language skills by studying in the U.S.

"I was like, 'Okay, I've got to sign up for an exchange program in the United States,'" he said.

Fares found Georgia College through a German exchange program.

After this fall semester, he'll go back to Ger-

many next semester to continue studying teaching and will graduate in summer 2023. For now, though, he's enjoying the diversity of people and activities in America. He especially enjoys being a member of Georgia College's International Club.

"It's all about diversity, inclusivity and getting everyone together—that feeling of being one even though we are different," Fares said.

He's adjusting to his newer surroundings, thanks to support from the International Education Center staff. He also found mentors in Omar Odeh, associate vice president for Strategic Communications and James Goforth, his Connection program father in Milledgeville. Goforth made Fares feel at home and opened many doors for him.

"I'm thankful for Jason Wynn, who was responsible since day one for my Visa and everything

I needed to come to the U.S.," Fares said. "I'm also grateful to Susie Ramage who connected me with people, like Omar Odeh."

"I felt that connection of home, because of Omar and his Arabic family," he said. "They had me over to their house twice. It was nice getting to know his family. Omar's a very authentic man. We have so many similarities."

His favorite professor is Dr. Craig Callender, associate professor of linguistics, who speaks German and worked in Germany for two years.

"Dr. Callender is easy to talk to. He's the whole package—an intellectual, sophisticated and authentic person," Fares said.

"I enjoy learning about the American education system," Fares said. "I want to be a role model for students of the English language."



Abbas Fares of Germany is practicing his English skills at GCSU.

## What's going on in Bobcat Territory?

Visit [frontpage.gcsu.edu/events](http://frontpage.gcsu.edu/events)

Tuesday

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5-6 p.m. GCSU Speech & Debate Team will deliver excerpts of original oratory, prose interpretations and debate in Heritage Hall at Ina Dillard Russell Library.

7:30 p.m. Warp Trio with GCSU Orchestra presents "Black Voices" concert in Magnolia Ballroom.

Wednesday

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5:30-7:30 p.m. GCSU Women's Basketball vs. Limestone at Centennial Center.

7:30 p.m. GCSU Opera Ensembles presents "Wedding Bells and Family Ties" concert in Max Noah Recital Hall.

Thursday

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6-7:30 p.m. Music Therapy Creative Expressions Performing Arts Group presents "Love in Us" in New City Church, Milledgeville.

6-8 p.m. Women's Center reception for opening of photography exhibit "Embodied."

7:30-8:30 p.m. The Martin Lammon Reading Series at Blackbird in Milledgeville.

Friday

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Saturday

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