

Tec professor secures international funding for cancer research



The research is being led from the Querétaro campus in collaboration with the University of Texas at Austin (UT).

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Sujay Paul

A research project led by [Sujay Paul](#), a research professor at **Tecnológico de Monterrey's Querétaro campus**, which aims to develop new options for treating conventional therapy-resistant **colorectal cancer**, has secured **international funding**.

The project, which was developed in collaboration with the **University of Texas at Austin**, has received the [Tec-UT Seed Grant Fall 2025](#) to continue developing proposals that combine nanotechnology, natural compounds, and precision gene therapies.

“This recognition is a testament to the scientific rigor and pioneering research carried out at Tecnológico de Monterrey,” said the researcher.

The research, entitled [“Harnessing Nature and Nanotechnology to Overcome Drug-Resistant Colorectal Cancer,”](#) proposes a **therapeutic strategy** that combines the **natural anticancer** phytochemical thymoquinone with **antimicroRNA-21** to simultaneously destroy **tumor cells and the molecular pathways** responsible for treatment resistance.

Professor Sujay Paul with his work group at the Tec’s Querétaro campus.

Photo: Sujay Paul



More than a collaboration

This project stems from a **scientific collaboration** between **Tecnológico de Monterrey** and the **University of Texas at Austin (UT)** which included the participation of [Devleena Samanta](#), a UT Chemistry professor.

The **research** proposes blocking the **molecular pathways** associated with **treatment resistance** while simultaneously destroying **tumor cells**. To achieve this, the **team** developed a “*dual attack*” approach, using **thymoquinone**, a **phytochemical** to **eliminate cancer cells**, and antimicroRNA 21 to **neutralize** the **tumor’s genetic resistance**.

Both components are **encapsulated** in a **folic acid-coated nanoformulation**, which acts as a “*biological GPS*” by **precisely targeting malignant cells** while **minimizing damage** to **healthy tissues**.

“We’re seeking to develop an innovative colorectal cancer therapy using nanoparticles to deliver natural bioactive compounds and molecules designed to block tumor resistance,” he said.

According to Paul, **the project’s main innovation** consists of integrating **three cutting-edge disciplines** into a single **therapeutic platform: naturally derived bioactive** compounds, non-coding RNA therapies, and functionalized nanoparticles for **targeted treatment delivery**.

“We’re seeking to develop an innovative colorectal cancer therapy using molecules designed to block tumor resistance.”

This approach targets not only the **cancer cells themselves**, but also the **molecular pathways** that **enable their growth and drug resistance**. Instead of **focusing** on a **single therapeutic objective**, the project aims **to reprogram the biological networks** behind **cancer progression**, which could offer a **much more precise alternative** to **conventional treatments**.

Research vs. cancer

The research **is** focused on **developing nanomedicines and gene therapies** derived from **natural compounds** to **treat chronic diseases**, specifically **cancer and metabolic disorders**.

In recent years, the team has developed **nanoformulations** of **therapeutic phytochemicals** and studied **non-coding RNAs**, molecules that regulate **gene expression** and play a role in the development of various diseases.

The project stems from a **scientific collaboration** between **Tecnológico de Monterrey and the University of Texas at Austin**, where both institutions identified the opportunity to **combine expertise in nanotechnology, natural compounds, and therapeutic RNA** to develop **new therapies** against **treatment-resistant cancer**.

From **the Querétaro campus**, the **group led by Paul** has been **a pioneer in the synthesis** of nature-inspired **nanotechnology platforms**.

“The collaboration with UT Austin allows us to combine our expertise, infrastructure, and experience to address complex, global problems,” he explained.

The researcher in the Bioengineering Center laboratory at the Tec's Querétaro campus. Photo: Sujay Paul



"This partnership demonstrates our campus' ability to generate strategic alliances with world-renowned institutions," he said.

The initiative has been **backed by** the **Texas Global Seed Grants program**, which aims to **cultivate** strategic **collaborations and promote scalable research** for international funding opportunities from organizations such as the United States **National Institutes of Health** (NIH) and the **National Science Foundation** (NSF).

*"I'm deeply grateful to **Tec de Monterrey** for their continued support of this international partnership, and to Texas Global for making this collaboration possible," added the researcher.*

International experience for students

Undergraduate and graduate students from the Querétaro campus **are actively involved** in the different phases of research; **their activities** include **cell culturing, nanoparticle characterization, molecular analysis, and experimental data processing.**

In Paul's words, this level of global collaboration allows them to **build competencies** in **cutting-edge areas** such as nanomedicine, biotechnology, and precision medicine, all while **interacting** with **researchers** from **leading global institutions.**

"For our students and researchers, this alliance creates new opportunities for training, academic exchanges, and developing high-impact international initiatives," he said.

New precision therapies

Beyond colorectal cancer treatments, researcher Sujay Paul pointed out that this **line of research** aims to **contribute to developing smart therapies** that integrate **nanotechnology** and RNA-based **medicine** for **tackling complex diseases.**

"We hope to lay the groundwork for more effective strategies to target treatment-resistant tumors, a problem affecting thousands of patients worldwide," he said.

From a **scientific perspective**, the researcher explained that the **goal** is to demonstrate that **non-coding RNAs** can **become clinically viable targeted therapies** when **combined** with **advanced nanoparticle delivery systems.**

If successful, this approach **could lead to new treatments** for **cancer** and **other chronic diseases** in which these molecules are implicated.

Finally, **Paul highlighted the international collaborative effort.** He **thanked his colleagues**, including Professor **Devleena Samanta**, from the University of Texas at Austin, **Padmavati Sahare**, a postdoctoral researcher at Tecnológico de Monterrey, Professor **Gabriel Luna Bárcenas** (Faculty of Excellence, Tec de Monterrey), Professor **Miriam Estévez** (UNAM), and Professor **Asim K. Duttaroy** (Faculty of Medicine, University of Oslo)

“Experience and collaboration have significantly enriched this research,” he concluded.

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