

Scientist Based in the U.S. Develops Biologically Intelligent Molecule That Identifies and Destroys Cancer Cells

Researcher at Harvard Medical School develops AI-driven molecule targeting tumor mitochondria defects to destroy cancer cells without harming healthy tissue.

ORLANDO, FL, UNITED STATES, March 26, 2026 /EINPresswire.com/ -- A Brazilian scientist [based in the United States](#) has developed an experimental platform guided by artificial intelligence capable of identifying cancer cells and triggering their destruction from within. The strategy targets a metabolic vulnerability typical of tumors located in the mitochondria, the organelles responsible for cellular energy production.



José Emilio Fehr Pereira Lopes, a postdoctoral fellow at the Dana-Farber Cancer Institute, affiliated with Harvard Medical School

The technology was created by José Emilio Fehr Pereira Lopes, a postdoctoral fellow at the Dana-Farber Cancer Institute, affiliated with Harvard Medical School. The research integrates molecular engineering, cellular bioenergetics and computational modeling to design molecules capable of acting selectively against cancer.

The concept is based on a well-established principle: cancer cells generate energy differently from healthy cells. This metabolic shift, described nearly a century ago by Otto Warburg, is one of the hallmarks of cancer and a promising therapeutic target.

At the center of the platform is a synthetic compound known as A14, described as a “bio-intelligent molecule,” designed to enter tumor cells and interfere directly with mitochondrial function.

“For decades we have tried to block tumor growth from outside the cell. Our strategy was

different: to take the molecule inside and exploit a flaw in dysfunctional mitochondria,” Lopes explains.

According to the researcher, A14 recognizes biochemical patterns specific to tumor cells and induces a collapse in the mechanisms that sustain their growth. In theory, this allows tumors to be attacked without widespread damage to healthy tissues.

“This is not about indiscriminately attacking rapidly dividing cells, as in traditional chemotherapy. The idea is to recognize specific characteristics of cancer and act only on them,” he says.

Delivering the molecule inside the cell

Designing the molecule was only part of the challenge. A key obstacle was ensuring it could reach cancer cells intact.

A14 belongs to the class of esters, which are rapidly degraded by enzymes called esterases. Tumors also adapt by altering receptors and metabolic pathways to evade treatment.

“When therapies act from outside the cell, they depend on receptors on the tumor surface. Under treatment pressure, cancer can change these structures,” Lopes notes.

To overcome this, the team developed transport systems that protect the molecule and deliver it into the cell without relying on external receptors. Among the strategies are sugar-derived carriers that encapsulate the compound.

In healthy cells, mitochondrial signals trigger programmed cell death, or apoptosis. In cancer, this mechanism is blocked.

“In tumors, altered mitochondria trap the protein responsible for apoptosis,” he explains.

This dysfunction is linked to angiogenesis, inflammation, immune suppression and metastasis.

To improve delivery, researchers use artificial intelligence to identify optimal transport materials for different tumors. The approach resembles a “Trojan Horse,” exploiting the tumor’s high energy demand.

“It is like using the cancer’s own metabolism against it. The tumor needs more energy, and we use that to guide the therapy,” Lopes says.

“It is important to note that this technology will require substantial investment to complete all testing stages before submission to the FDA for authorization of clinical trials in humans. That is why we are actively seeking companies interested in participating in these next chapters of development,” he adds.

A programmable molecular platform

The platform has been refined over years, with advances in delivery systems and formulations. Modified sugars improve stability and solubility, while mass spectrometry and chromatography confirmed incorporation into carriers.

Lopes describes the innovation as a programmable molecular platform adaptable to different cancer types.

“We tried to teach a molecule to behave like a physician inside the body. It must recognize the problem, identify the altered cell and make a precise decision,” he says.

That decision is to release the protein trapped in mitochondria and trigger apoptosis, leading the cancer cell to self-destruct.

Still in an experimental stage, the technology requires further validation, including preclinical studies and human trials. Even so, it represents a promising approach within precision oncology, focused on treatments tailored to each tumor’s biology.

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