# Cancer Breakthrough As Doctors Unveil Way to Zap Tumors into Oblivion Without Chemo

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A new cancer treatment that uses light could remove the need for harsh chemotherapy or radiotherapy.

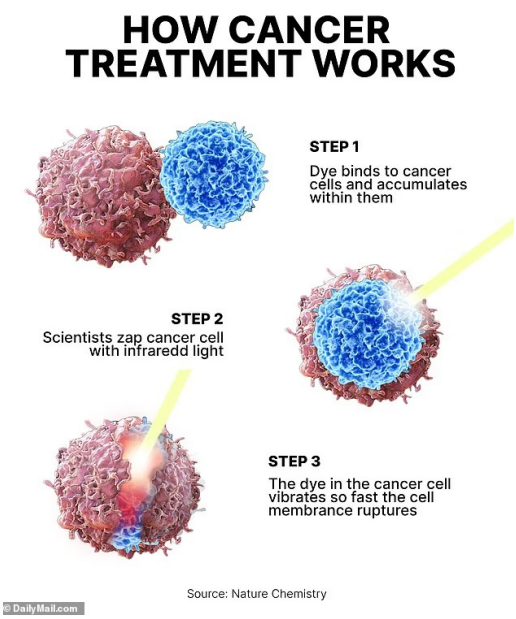
**Texas** researchers have devised a way to use infrared light as a jackhamm er that can tear **cancer** cells apart from the inside, showing in trials to have eliminated melanomas, the deadliest form of skin cancer.

A synthetic blue dye often used in hospital imaging naturally binds to cancer cells.

Researchers found that when the cancer cells were zapped with infrared light, it triggered violent shaking that tore through the cancer cell's membrane, causing it to die without any heat or harsh drugs.

The latest **breakthrough method** – known as vibronic-driven action – had a 99 percent efficiency against lab cultures of human skin cancer cells, and half of the mice with melanoma tumors became cancer-free after just one treatment.

'It is a whole new generation of molecular machines that we call molecular jackhammers,' said Rice University nanotechnologist Dr James Tour.




Near-**infrared light** can penetrate up to 10 cm into the body, reaching organs and bones without surgery. Light particles can also be functionalized to only bind to cancer cells, mitigating damage done to healthy cells.

The treatment itself is highly targeted because the atoms of dye bind to the receptors on cancer cells while leaving healthy cells largely untouched. It has already shown in followup trials to kill colorectal cancer, prostate cancer, and breast cancer cells.

The next step will be determining whether this same molecular jackhammer will destroy cancer cells in humans.

‘This study is about a different way to treat cancer using mechanical forces at the molecular scale,’ said Ciceron Ayala-Orozco, a Rice research scientist who is a lead author on the study.

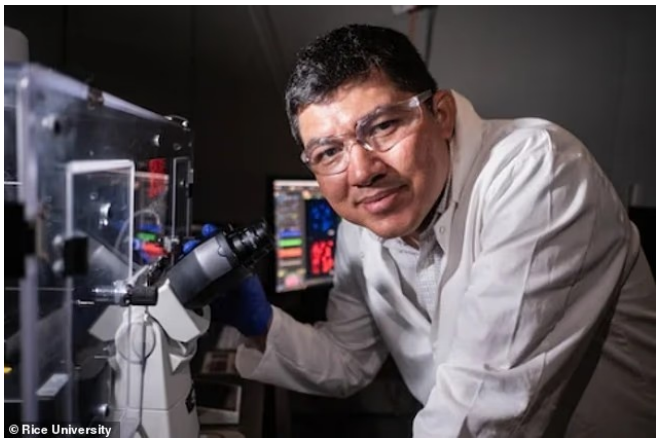



*Figure 1: Figure 1: Ciceron Ayala-Orozco, a Rice research scientist who is a lead author on the study, said: ‘This study is about a different way to treat cancer using mechanical forces at the molecular scale'*

If scaled up to human patients, the treatment's impact could be sweeping. An estimated 1.5 million Americans are living with melanoma, 1.4 million have colorectal cancer, and 300,000 men have prostate cancer.

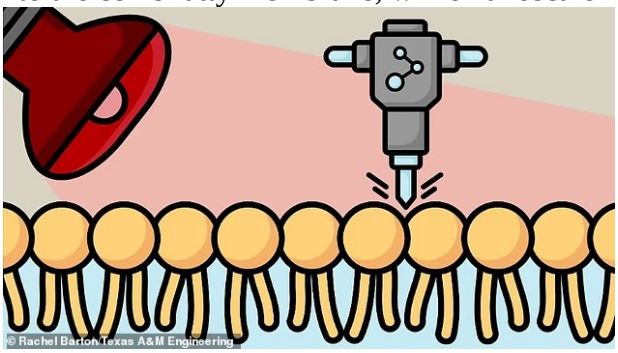
In 2025, approximately 316,950 women will be diagnosed with severe, invasive breast cancer.

The unassuming dye found in hospitals nationwide is a key feature of vibronic-driven action.

After it binds to receptors on melanoma cells, it is assaulted with infrared light, which triggers an earthquake in the cell. The dye atoms begin to vibrate in unison.

The dye's electrons sync up into a "plasmon"—a wave of collective motion. This energy couples with the molecule's natural vibrations, making the entire structure shudder at 41 trillion times per second.

The violent oscillating energy is transferred directly into the cell’s fatty membrane, while nanoscale holes tear open, allowing fluid and foreign molecules to flood in.




This fast-moving mechanical force is such that ‘anything around it will be disassembled,’ Ayala-Orozco said.
The cancer cell crumbles as the holes poked in its membrane increase, and dies without further use of any drug or radiation treatment.

The Texas team's findings were published in the journal **Nature Chemistry**.

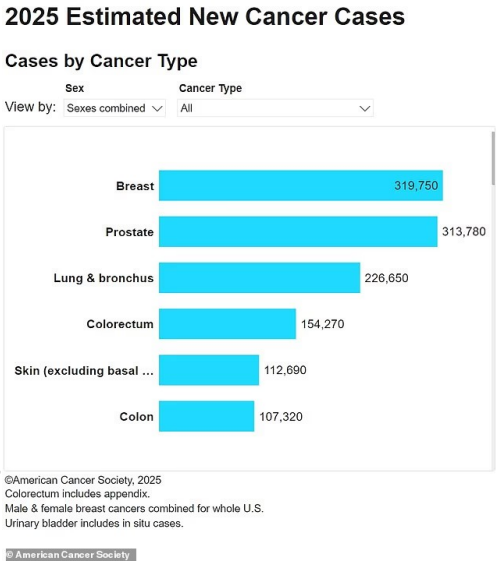
Ayala-Orozco said: ‘These molecules are simple dyes that people have been using for a long time.

'They’re biocompatible, stable in water and very good at attaching themselves to the fatty outer lining of cells. But even though they were being used for imaging, people did not know how to activate these as plasmons.’

After struggling for years to make blue-light-activated motors work against mouse tumors, Ayala-Orozco turned to explore completely different approaches.

‘I started to think that maybe what I needed was not necessarily a motor, but a molecule that absorbs near-infrared light, in the hopes that this molecule could be activated and could move in a different way — not necessarily by rotation,' he told **Healio**.

‘That’s when I started thinking about some molecules called cyanines and started connecting the dots with a property from photophysics called plasmons, which I studied during my PhD to treat cancer. They are activated by near-infrared light. At some point, I decided I had to try this.’




When researchers turned their microscopes on other cancer types, they made an exciting discovery: the molecular jackhammers proved just as devastating against prostate, breast, and colorectal cancer cells in petri dishes.

‘No matter which line, we are able to eliminate 100 percent on cell culture,’ Ayala-Orozco said.

The university will need to partner with a private company to scale up, overcome regulatory hurdles, and enter human trials, ‘hopefully, within 5 to 7 years,’ Ayala-Orozco said.

*Source: https://www.dailymail.co.uk/health/article-14803131/cancer-breakthrough-doctors-zap-tumors-without-chemo.html*