A New Light Therapy Could Help Target Dormant Cancer Cells

1 MIN READ

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Researchers may have found a way to target hard-to-destroy cancer cells with the flip of a switch.

Just like bears hibernate to protect themselves from the stress of winter, cancer cells "sleep" to protect themselves from the stress of chemotherapy. Unfortunately, it's a good strategy: chemotherapy doesn't work as well when cancer cells are dormant. But a team of Swiss researchers recently developed a **light-based strategy** to wake up these cells, which could make future cancer treatments more effective.

The new light-based tool targets a protein inside cancer cells called glucocorticoid receptors. **Stress hormones** trigger glucocorticoid receptors, which then tell cancer cells to go to sleep. Destroying these receptors helps wake up the cells.

"The central goal was to develop a tool that allows glucocorticoid receptor degradation to be controlled precisely in space and time, using light," **Robin Scheuplein**, a PhD candidate in the Gapp Lab at ETH Zurich and co-first author on the study, told Super Age in an email.

Precision is crucial. You don't want to destroy all glucocorticoid receptors because there are important receptors outside cancer cells which **support immune function** and help control inflammation.

"Our light-controlled degrader (a "photoPROTAC") can be switched off outside the tumor, protecting healthy tissue," Scheuplein added.

Chemotherapy Targets Fast-Growing

Cells

Chemotherapy fights fast-developing cells because cancer cells typically grow and divide quickly. (Hair follicle cells are also fast-growing, which explains why this treatment causes **hair loss**.)

“When we say that cancer cells become dormant, what we mean is that they are growing, or proliferating, at reduced rates. While in this state, cancer cells can increase their chances of survival in challenging environments, including exposure to chemotherapies,” **Ben Greulich, PhD**, an assistant professor of Biology at Mercer University, who was not involved with the study, told Super Age in an email.

This doesn’t only affect people in active treatment. Cancer cells may sleep for long periods of time, then wake up years later to form **metastatic tumors** in a different part of the body. Given that risk, some researchers are **taking a different tack**, encouraging these cells to hibernate indefinitely to prevent cancer recurrence.

But the current study suggests that being able to turn on these cancer cells in a controlled environment could make chemotherapy much more effective and precise.

“A patient might have a drug delivered through an IV, but it only activates in the tumor that you are illuminating with a specific wavelength of light. This is incredibly exciting and holds the potential to dramatically reduce off-target effects of therapies to which it can be applied,” Greulich added.

The Future of Cancer Treatments

Scheuplein and the research team tested this therapy on lung cancer cells in a lab. While their study showed promising results, we have a ways to go before this could become standard therapeutic practice.

“The current switch responds to UV light, which does not penetrate tissue deeply. Adapting the system to respond to near-infrared light will be important for reaching tumors that sit deeper in the body than an endoscope can reach,” Scheuplein said.

Other strategies have been developed to wake up dormant cancer cells. **A 2019 animal study** showed that destroying the Fbxw7 gene in breast cancer cells helps wake up these cells. And the idea of using **light as a treatment** has been explored for multiple types of cancer, skin disease, and bacteria and viral infections.

“On the clinical side, we’re optimistic about translation given that light-based treatments are already an established part of medicine, and emerging techniques to make tissue temporarily more optically transparent could further extend how deep this approach can reach in the future,” Scheuplein added.

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