



Press Release

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Light-sensitive drug acts as Trojan horse to kill cancer cells

A light-activated drug that can enter and kill cancer and bacterial cells without harming nearby healthy cells has been tested successfully.

Scientists found that combining the tiny cancer-killing molecule with a chemical food compound can trick cancer cells into ingesting the drug.

The molecule – called SeNBD – is smaller than existing light-sensitive treatments, which means it can pass through the cell's defences much easier.

Researchers say further tests are needed to show if the drug is a safe and quick method of treating early stage cancers and drug-resistant bacteria. This study was carried out in zebrafish and human cells.

Coupling the drug with a food compound is key to its success. For cells to survive, they must consume chemical components of food – known as metabolites – such as sugars and amino acids for energy.

Cancer and bacterial cells are greedy, tending to consume higher concentrations and different types of metabolites than healthy cells. Pairing SeNBD with a metabolite makes it ideal prey for harmful cells.

Until now, most light-activated drugs have been bigger than metabolites, which means cancer and bacterial cells do not recognize them as normal food.

Researchers at the University of Edinburgh, who have invented SeNBD, compare it to a Trojan horse and describe its effect as that of a metabolic warhead. Harmful cells ingested the linked drug without being alerted to its toxic nature.

As well as being small enough to enter cells, SeNBD is also a type of drug called a photosensitiser, which means that it kills cells only after it is activated by visible light.

Switching on the drug with light means a surgeon could decide exactly where they want the drug to be active, avoiding the chances of attacking healthy tissue and preventing the kind of side effects, such as hair loss, caused by other anticancer drugs.

The findings of this research are published in *Nature Communications* journal:

<https://www.research.ed.ac.uk/en/publications/photoactivatable-metabolic-warheads-enable-precise-and-safe-ablat>

Lead researcher Professor Marc Vendrell, Chair of Translational Chemistry and Biomedical Imaging at the University of Edinburgh, said: "This research represents an important advance in the design of new therapies that can be simply activated by light irradiation, which is generally very safe. SeNBD is one of the smallest photosensitizers ever made and its use as a 'Trojan horse' opens many new opportunities in interventional medicine for killing harmful cells without affecting surrounding healthy tissue."

Dr Sam Benson, Post-doctoral researcher, at University of Edinburgh's Centre for Inflammation, said: "With SeNBD, we can combine a light activated drug with the food that cancerous and bacterial cells



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normally eat. This means we can deliver our 'Trojan horse' directly through the front door of the cell rather than trying to find a way to batter through the cells defences."

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