Scientists use diabetes drug in double hit to starve cancer cells

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(Medical Xpress) -- UK scientists have discovered how blocking a key controller of energy production in cancer cells and treating them with a diabetes drug, metformin, effectively starves cancer cells. The research1 is published today (Sunday) in *Nature Cell Biology*.

One of the key characteristics of cancer cells is their ability to divide and grow quickly. To do this they need to switch to a method of producing energy rapidly, which breaks down glucose in a process called glycolysis. By doing this they generate the energy and raw materials needed to create new cells.

The researchers found that this switching is controlled by a protein complex called NF-kB, which controls the balance between different types of energy generation. When glucose supplies run short, NF-kB moves energy generation to an alternative process that doesn't rely on glucose. But blocking NF-kB in cancer cells leaves them unable to make this switch and so they ultimately die.

By targeting this protein complex, the researchers showed they could kill bowel cancer cells in the lab. To mimic the effect of glucose starvation, the researchers first treated the cancer cells with a molecule that blocks NF-kB, though by itself it has no effect on survival. But when combined with the diabetes drug metformin, which blocks alternative methods of energy production, they effectively besiege the cancer cells so that they starve and die.

Professor Guido Franzoso, lead researcher based at Imperial College London, said: “This is the first time that NF-kB has been shown to control how cells generate energy. We already knew that NF-kB plays a role in cancer. It is part of a family of regulators that control the immune and inflammation responses and have been shown to promote the disease.

“Inhibitors of NF-kB are currently used in the clinic to treat cancer patients but have had limited success, due to their side effects. We hope that we can now start exploring the possibility of combining them with metformin as a double hit to increase their effectiveness against cancer.”

Dr Julie Sharp, senior science information manager at Cancer Research UK, said: “Cancer cells need a rapid supply of energy to grow and divide and understanding how they generate energy is an exciting area of research. By blocking energy production, effectively starving the cells, researchers have revealed a new way to selectively attack cancer cells leaving normal cells unharmed.”

More information: Mauro, C et al NF-kB controls energy homeostasis and metabolic adaptation by upregulating mitochondrial respiration *Nature Cell Biology* (2011)

Provided by Cancer Research UK