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Experts make breakthrough in brain cancer research

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Scientists at Newcastle University, UK, have made a pioneering breakthrough in the understanding of how a fatal brain tumour grows—which could lead to improved treatments for patients.

Experts have found cells within the malignant brain tumour, glioma, rely on fats to fuel growth. This contradicts previous scientific belief that tumour cells require mainly sugars to make energy.

Glioma is the most common form of primary malignant brain tumour in adults, with approximately four cases per 100,000 people each year. Gliomas remain one of the hardest to treat cancers.

This new discovery provides a unique view of brain cancer cell biology which has significant implications for understanding the behaviour of tumours and improve treatments for this condition.

The study made use of tumour tissue donated by patients undergoing surgery, as well as mouse models of the disease.

Findings of the research are published online today in the journal, *Neuro-Oncology*.

Dr Elizabeth Stoll, from Newcastle University's Institute of Neuroscience, is lead author of the ground-breaking study.

She said: "Patients with malignant glioma currently receive a poor

prognosis, and new interventions are desperately needed to increase the survival and quality of life for patients with the condition.

"Our results provide new insight into the fundamental biochemistry of cancer cells, with exciting implications for patients in the future.

"Most cells within the adult brain require sugars to produce energy and sustain function. Interestingly, we have discovered that malignant glioma cells have a completely different metabolic strategy as they actually prefer to break down fats to make energy.

"Our finding provides a new understanding of brain tumour biology, and a new potential drug target for fighting this type of cancer."

In the study, scientists showed that glioma cells grow more slowly if they are treated with a drug, known as etomoxir, which prevents the cells from making energy with fatty acids.

This discovery provides initial evidence for pursuing new therapeutic avenues to target fatty-acid metabolism in the clinical treatment of brain tumours to slow the progression of the disease.

The team highlight that this study does not address whether nutrition or diet influence tumour growth.

Dr Stoll said: "We tested etomoxir in our animal model, and showed that systemic doses of this drug slow glioma growth, prolonging median survival time by 17%.

"These results provide a novel drug target which could aid in the clinical treatment of this disease for patients in the future."

Stem cells were isolated from brains of mice and mutated to transform

them into cancer cells. These mutations were similar to those that normally accumulate to form glioma tumours in people.

The malignant cells were then implanted into mice of the same genetic background as the donor mice, allowing the team to assess the speed of growth of the tumour.

Dr Stoll and her team hope to carry out future studies to develop the drug with clinical partners, so that glioma patients may benefit from this research in the coming years.

More information: Fatty acid oxidation is required for the respiration and proliferation of malignant glioma cells, Hua Lin, Shaan Patel, Valerie S. Affleck, Ian Wilson, Douglass M. Turnbull, Abhijit R. Joshi, Ross Maxwell, and Elizabeth A. Stoll, *Neuro-Oncology*, DOI: 10.1093/neuonc/now128

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