Research breakthrough could see HIV drugs used to treat low-grade brain tumors

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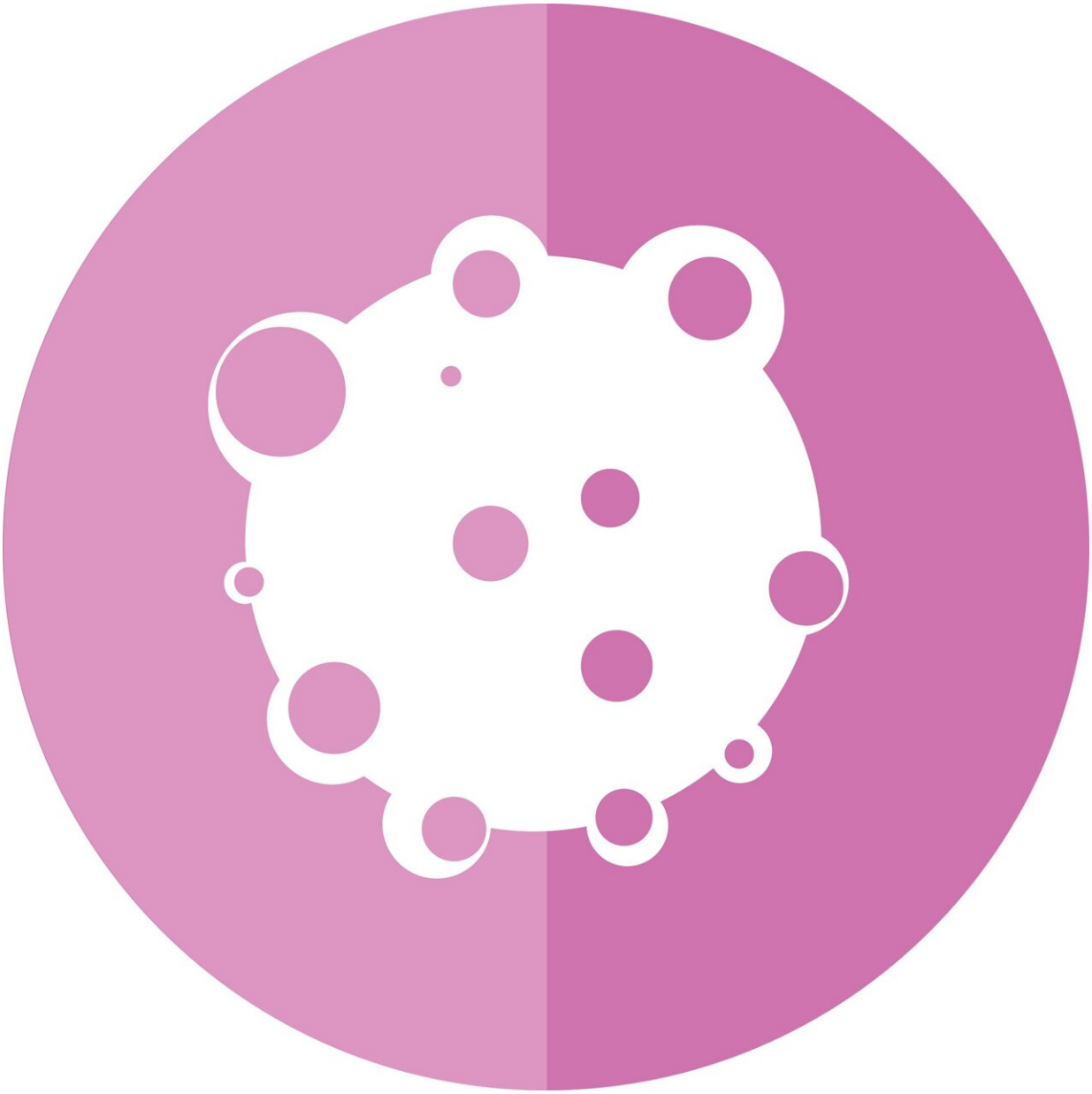

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Drugs developed to treat AIDS and HIV could offer hope to patients diagnosed with the most common form of primary brain tumor.

The breakthrough, co-funded by the charity Brain Tumor Research, is significant because, if further research is conclusive, the anti-retroviral drugs could be prescribed for patients diagnosed with meningioma and acoustic neuroma brain tumors (also known as schwannoma).

More effective approaches are urgently needed as there are very few treatment options for these tumor types which frequently return following surgery and radiotherapy.

Meningioma is the most common form of primary brain tumor. Mostly low-grade, it can become cancerous over time, and develops from cells located in the meninges which protect the brain and spinal cord. Acoustic neuroma is a different type of low-grade, or non-cancerous brain tumor, which develops in nerve-protecting cells called Schwann cells. Both tumors may occur spontaneously, usually in adulthood, or in the hereditary disease Neurofibromatosis type 2 (NF2) in childhood/early adolescence.

Researchers at the Brain Tumor Research Center at the University of Plymouth have shown previously that a tumor suppressor, named Merlin, contributes to the development of meningioma, acoustic neuroma and ependymoma tumors. It can also contribute to neurofibromatosis type 2 (NF2). Tumor suppressor genes play important roles in normal cells by controlling division or repairing errors in DNA. However, when tumor suppressors do not work properly or are absent, cells can grow out of control, leading to cancer.

In this latest study Dr. Sylwia Ammoun, Senior Research Fellow, and her collaborator, Dr. Robert Belshaw investigated the role that specific sections of our DNA play in tumor development. Named 'endogenous retrovirus HERV-K', these sections of DNA are relics of ancient infections that affected our primate ancestors, which have become stable elements of human DNA.

Dr. Ammoun said that "high levels of proteins produced by HERV-K DNA have previously been linked to the development of different tumors. In this study, the team showed that high levels of HERV-K proteins were present in meningioma and schwannoma cells obtained from patients. The team was also able to identify molecular events that may enable HERV-K proteins to stimulate the growth of these tumors. Furthermore, several drugs were identified that target these proteins, reducing the growth of schwannoma and grade I meningioma cells in the laboratory."

Professor Oliver Hanemann, Director of the Brain Tumor Research Center of Excellence, added that "Significantly, these drugs—the retroviral protease inhibitors ritonavir, atazanavir, and lopinavir—have already been approved by the for use in the treatment of HIV/AIDS in the U.S. and are also available in the UK. These results revealed HERV-K proteins to be critical regulators of growth in tumors that are deficient in Merlin."

Hugh Adams, spokesperson for Brain Tumor Research, said that "these findings are extremely significant as drug repurposing is a valuable way to accelerate the testing of new approaches into clinical trials which, if successful, could reach patients sooner. This is particularly critical for patients with brain tumors as many of them do not have the luxury of time."

The full study, entitled Human endogenous retrovirus type K promotes

proliferation and confers sensitivity to anti-retroviral drugs in Merlin-negative schwannoma and meningioma is available to view in the journal *Cancer Research*

More information: Emmanuel A Maze et al, Human endogenous retrovirus type K promotes proliferation and confers sensitivity to anti-retroviral drugs in Merlin-negative schwannoma and meningioma., *Cancer Research* (2021). DOI: 10.1158/0008-5472.CAN-20-3857

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