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Treatment of common virus can reduce tumour growth

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Researchers at Karolinska Institutet in Sweden have demonstrated for the first time that it is possible to inhibit the growth of brain tumours by treating the common Cytomegalovirus (CMV). The virus, which is found in a wide range of tumour types, offers a possible route towards controlling tumour growth and reducing the size of the tumour as a complement to conventional cytotoxin-based therapies.

The CMV is a common virus that is found in 70-75 per cent of the adult population. Normally it is dormant and goes unnoticed, but when a cancer develops in the body, the virus seems to control many of the mechanisms in the cancer cells. Brain tumours, breast cancer, colon cancer and prostate cancer are some of the cancer forms in which CMV may play a central role. By studying medullablastomas, the most common form of childhood brain tumour, researchers at Karolinska Institutet have been able to show for the first time the presence of CMV in these tumours and that treatment for CMV can reduce tumour growth.

"We show in this study that CMV is found in 92 per cent of tumours from medullablastoma patients," says Professor Cecilia Söderberg-Nauclér. "We also show in experimental systems that we can inhibit the growth of these tumours with antiviral drugs, which opens up a new potential therapeutic approach to certain tumours in the future."

Earlier studies have shown that many forms of tumour also have a higher expression of the COX-2 enzyme, which is not found in normal tissue but which plays a key part in inflammations and the development of

cancer. As regards tumours, it has previously been shown that for unknown reasons COX-2 is induced in tumour cells; a phenomenon often associated with poor prognoses. Further, the knowledge that COX-2 inhibitors reduce the risk of cancer has led to their use in clinical studies for cancer prevention. CMV in turn, greatly and specifically stimulates the synthesis of COX-2 and is thus a possible control signal for tumour growth. COX-2 inhibitors also reduce the production of CMV. The researchers now show in their paper, which is published in the *Journal of Clinical Investigation,* that tumour growth decreases when CMV is inhibited.

"Our experiments on mice show that tumour growth declines by around 40 per cent when antiviral drugs or COX-2 inhibitors are used separately, and by no less than 72 per cent when used in combination," says Professor Söderberg-Nauclér, adding that this effect is achieved without using chemotherapy.

Since both the drugs used in the study, an NSAID that inhibits CMV replication and inflammation, and the antiviral Valcyte (Valganciclovir) for CMV infection, have relatively good adverse effect profiles, the researchers now see immediate opportunities for studying their impact on different forms of tumour. Antiviral drugs are also selective and largely affect infected cells.

"These are very promising and exciting results," says Professor Söderberg-Nauclér. "The virus infection isn't cured by the treatment, nor is the tumour, but the virus in the tumour decreases, which affects its growth. This therefore presents a new approach to treating tumours and could henceforth be used as a possible complementary therapy."

More information: Ninib Baryawno, Afsar Rahbar, Nina Wolmer-Solberg, Chato Taher, Jenny Odeberg, Anna Darabi, Zahidul Khan, Baldur Sveinbjörnsson, O-M Fuskevåg, Lova Segerström, Magnus

Nordenskjöld, Peter Siesjö, Per Kogner, John Inge Johnsen & Cecilia Söderberg-Nauclér, Detection of human cytomegalovirus in medulloblastomas reveals a potential therapeutic target, *Journal of Clinical Investigation*, online 26 September 2011.