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Virus might fight brain tumors better if armed with bacterial enzyme, study shows

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New research shows that oncolytic viruses, which are engineered to destroy cancer cells, might be more effective in treating deadly brain tumors if equipped with an enzyme that helps them penetrate the tumor.

The enzyme, called chondroitinase, helps the cancer-killing virus clear its way through the thickets of protein molecules that fill space between cells and impede the virus's movement through the tumor, say researchers at the Ohio State University Comprehensive Cancer Center-Arthur G. James Cancer Hospital and Richard J. Solove Research Institute who conducted the study.

When tested in animals transplanted with a human glioblastoma, the most common and deadly form of brain cancer, the enzyme-armed virus improved survival by 52 percent compared with controls and in some cases eliminated the tumor entirely.

The findings were published online in the journal *Clinical Cancer Research*.

"Our results show for the first time that an oncolytic virus with this enzyme can spread more effectively through the tumor and underscores the potential of using chondroitinases to enhance the capacity of oncolytic viruses to destroy cancer cells," says study leader Balveen Kaur, associate professor of neurological surgery.

The enzyme is derived from the intestinal bacterium called Proteus

vulgaris. The enzyme removes sugar chains that branch from molecules called proteoglycans, which fill the narrow spaces between cells. By cutting away these branches, the enzyme clears a path that helps the virus spread through the tumor.

During this study, Kaur and her collaborators injected human glioblastoma cells under the skin of eight animals, and then, after tumors developed, treated the tumors with the enzyme-armed virus. These mice survived an average of 28 days, with two remaining tumor-free after 80 days. Control animals, treated with a virus that lacked the enzyme, survived 16 days.

In another experiment, mice with human gliobastomas transplanted into the brain survived 32 days versus 21 days for control animals, an improvement of 52 percent. Again, two animals lived more than 80 days and showed no trace of the tumor afterward.

Additional studies showed that the enzyme-laden virus had penetrated tumors in the animals' brain significantly better than the enzyme-free control virus.

"Overall, our results indicate that an oncolytic virus armed with this enzyme can have a significantly greater anticancer effect compared with a similar virus without the enzyme," Kaur says.

Provided by Ohio State University Medical Center