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Tumor-killing virus selectively targets diseased brain cells

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New findings show that a specialized virus with the ability to reproduce its tumor-killing genes can selectively target tumors in the brains of mice and eliminate them. Healthy brain tissue remained virtually untouched, according to a Feb. 20 report in *The Journal of Neuroscience*. With more research, the technique could one day offer a novel way of treating brain cancer in humans.

“Most importantly, this study finds that the virus can penetrate into the brain, where it even reaches cells that have migrated away from the main tumor,” says Harald Sontheimer, PhD, of the University of Alabama at Birmingham, who was not affiliated with the study. “Assuming that the virus behaves similarly in humans, in the future, it may provide a novel and highly efficacious way to treat resistant tumors.”

The study is the culmination of six years of basic research into the fundamental processes of viruses and the cells they target, conducted by senior author Anthony van den Pol, PhD, and his team at Yale University School of Medicine. They set out to test the vesicular stomatis virus, which was selected for its ability to attack brain tumors and leave healthy tissue largely uninfected.

Tumor cells from brain cancers commonly found both in people and in mice were implanted into immune-compromised mice, which then received an injection of the virus in the tail. By viewing fluorescent proteins embedded in both tumor and virus cells in the brains of living mice, van den Pol’s team watched as the virus infected multiple sites in

the brain, spreading across an entire tumor within three days, killing tumor cells in its wake. The virus did not target normal mouse tissue or non-cancerous human brain cells transplanted into the mouse brain, the team found. They speculated that, unlike those in healthy brain tissue, blood vessels within brain tumors may leak, allowing the virus to cross the usually impenetrable protective barrier around the brain.

The virus was equally effective in destroying tissue from cancers that start in the breast or lung and spread to the brain—the two cancers most likely to metastasize to the brain—and targeted tumors at different sites throughout the body. Each year in the United States, more than 20,000 new cases of brain or nervous system cancers are diagnosed, according to the National Cancer Institute.

Future research will focus on understanding potential safety risks, such as whether the virus could eventually infect normal brain cells, as well exploring potential changes to the virus that could mitigate such risk. “We have some ideas for making the virus safer in the human brain,” says van den Pol. “This is important to prevent the virus from potentially infecting normal brain cells after it has targeted the brain tumor.”

Source: Society for Neuroscience

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