

Novel gene editing approach to cancer treatment shows promise in mice

May 1 2017



Killer T cells surround a cancer cell. Credit: NIH

A novel gene therapy using CRISPR genome editing technology effectively targets cancer-causing "fusion genes" and improves survival in mouse models of aggressive liver and prostate cancers, University of

Pittsburgh School of Medicine researchers report in a study published online today in *Nature Biotechnology*.

"This is the first time that gene editing has been used to specifically target [cancer fusion genes](#). It is really exciting because it lays the groundwork for what could become a totally new approach to treating cancer," explained lead study author Jian-Hua Luo, M.D., Ph.D., professor of pathology at Pitt's School of Medicine and director of its High Throughput Genome Center.

Fusion genes, which often are associated with cancer, form when two previously separate genes become joined together and produce an abnormal protein that can cause or promote cancer.

Luo and his team had previously identified a panel of fusion genes responsible for recurrent and aggressive prostate cancer. In a study published earlier this year in the journal *Gastroenterology*, the team reported that one of these fusion genes, known as MAN2A1-FER, also is found in several other types of cancer, including that of the liver, lungs and ovaries, and is responsible for rapid tumor growth and invasiveness.

In the current study, the researchers employed the CRISPR-Cas9 genome editing technology to target unique DNA sequences formed because of the [gene fusion](#). The team used viruses to deliver the [gene editing](#) tools that cut out the mutated DNA of the fusion gene and replaced it with a gene that leads to death of the [cancer cells](#). Because the fusion gene is present only in cancer cells, not healthy ones, the gene therapy is highly specific. Such an approach could come with significantly fewer side effects when translated to the clinic, which is a major concern with other cancer treatments such as chemotherapy.

To conduct the study, the researchers used mouse models that had received transplants of human prostate and liver cancer cells. Editing the

cancer fusion gene resulted in up to 30 percent reduction in tumor size. None of the mice exhibited metastasis and all survived during the eight-week observation period. In contrast, in control mice treated with viruses designed to cut out another [fusion gene](#) not present in their tumors, the tumors increased nearly 40-fold in size, metastasis was observed in most animals, and all died before the end of the study.

The new findings suggest a completely new way to combat cancer.

"Other types of cancer treatments target the foot soldiers of the army.

Our approach is to target the command center, so there is no chance for the enemy's soldiers to regroup in the battlefield for a comeback," said Luo.

Another advantage over traditional cancer treatment is that the new approach is very adaptive. A common problem that renders standard chemotherapies ineffective is that the cancer cells evolve to generate new mutations. Using genome editing, the new mutations could be targeted to continue fighting the disease, Luo noted.

In the future, the researchers plan to test whether this strategy could completely eradicate the disease rather than induce the partial remission observed in the current study.

More information: Targeting genomic rearrangements in tumor cells through Cas9-mediated insertion of a suicide gene, *Nature Biotechnology* (2017). [nature.com/articles/doi:10.1038/nbt.3843](https://doi.org/10.1038/nbt.3843)

Provided by University of Pittsburgh Schools of the Health Sciences

Citation: Novel gene editing approach to cancer treatment shows promise in mice (2017, May 1) retrieved 23 April 2024 from

<https://medicalxpress.com/news/2017-05-gene-approach-cancer-treatment-mice.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.