

Coating cancer cells with silica to create a vaccine that energizes an immune response to tumor development

November 5 2021, by Bob Yirka



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A team of researchers working at the University of New Mexico Health Science Center has found some success in creating a cancer vaccine by coating cancer cells in silica and injecting them into test mice. In their paper published in the journal *Nature Biomedical Engineering*, the group

describes their work with creating personalized cancer vaccines and how well their efforts are working during testing.

A vaccine against cancer, in any or all of its forms, is a major goal of medical scientists. Some progress has been made—a vaccine that fights HPV, for example, has been found to be a very effective way to prevent women from developing cervical cancer. But much more work needs to be done before a vaccine can be made that works directly against [cancerous tumors](#)—either preventing their formation or eradicating them once they have already formed. Most such research is based on the idea of stimulating the [immune system](#) in ways that will make it more aggressively go after [cancer cells](#).

Unfortunately, as the researchers on this new effort note, the body does not express universal tumor antigens that can be used for such a vaccine. In their work, they are building on prior efforts that have shown that autologous tumor cells (cells collected from the same patient) may be used to create polyclonal individualized vaccines directed at certain types of cancers. This gets around the problem of having to find a universally expressed antigen.

To that end the researchers have been trying a new approach that involves using autologous tumor cells coated with silica—more specifically, by applying cryogenic silicification of [tumor cells](#). The process involves preserving tumor antigens recovered from a patient by covering them with a very tiny layer of silica—a method that preserves the antigens in a way that makes them available for use later—that is followed by adding a pathogen mimicking coating. The final coating serves to activate dendritic cells that stimulate antigens to T cells.

The researchers tested their idea by creating personalized vaccines for mice with ovarian cancer. They found the vaccine worked as intended—T cells became more aggressive in attacking the cancer cells

giving tumor and antigen-specific T cell immunity. The end result was complete eradication of the tumors in the mice.

More information: Jimin Guo et al, Cancer vaccines from cryogenically silicified tumour cells functionalized with pathogen-associated molecular patterns, *Nature Biomedical Engineering* (2021).
[DOI: 10.1038/s41551-021-00795-w](https://doi.org/10.1038/s41551-021-00795-w)

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Citation: Coating cancer cells with silica to create a vaccine that energizes an immune response to tumor development (2021, November 5) retrieved 17 April 2024 from
<https://medicalxpress.com/news/2021-11-coating-cancer-cells-silica-vaccine.html>

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