

Biodegradable biopolymer nanoparticles hold promise for twin attack on breast cancer

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Using a biodegradable polymer produced by a slime mold, a team of investigators from Cedars-Sinai Medical Center has created a multifunctional nanoparticle that attacks a key pathway involved in breast cancer in two different ways. Tests using animals with human breast tumors showed that the new nanoparticle produced a 90% reduction in tumor growth.

Julia Ljubimova, principal investigator of the National Cancer Institute-funded Cancer Nanotechnology Platform Partnership at Cedars Sinai, led this study. She and her colleagues published their findings in the journal *Cancer Research*.

[Late last year](#), Dr. Ljubimova and her team had demonstrated that [nanoparticles](#) made from the slime mold polymer poly(malic acid) could successfully target brain tumors and that these nanoparticles were well-tolerated by laboratory animals. In the current work, the Cedars-Sinai team used the same polymer as the backbone on which to hang an antisense oligonucleotide that would greatly reduce a breast cancer cell's production of the HER2/neu protein; the drug Herceptin, which acts to target [cancer cells](#) and to further block the activity of the HER2/neu protein; and an antibody to the transferrin receptor, which is overexpressed on the blood vessels that surround tumors. This antibody serves as an initial targeting agent that helps concentrate the nanoparticle around tumors.

When the researchers used this construct to treat mice bearing human

HER2/neu-positive breast tumors, the results were dramatic. HER2/new activity dropped precipitously in the treated animals, resulting in a marked reduction in tumor growth and even tumor regression. In contrast, [tumor growth](#) was only partially inhibited in animals treated with either Herceptin or the antisense oligonucleotide.

This work, which is detailed in a paper titled, "Polymalic Acid-Based Nanobiopolymer Provides Efficient Systemic [Breast Cancer](#) Treatment by Inhibiting both Her2/neu Receptor Synthesis and Activity," was supported in part by the NCI Alliance for Nanotechnology in Cancer, a comprehensive initiative designed to accelerate the application of nanotechnology to the prevention, diagnosis and treatment of cancer. [An abstract of this paper](#) is available at the journal's website.

More information: *Proceedings of the National Academy of Sciences:* "Inhibition of brain tumor growth by intravenous polymalic acid nanobioconjugate with pH-dependent drug release."

Provided by National Cancer Institute

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