Plastic antibody works in first tests in living animals

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Scientists are reporting the first evidence that a plastic antibody -- an artificial version of the proteins produced by the body's immune system to recognize and fight infections and foreign substances -- works in the bloodstream of a living animal. The discovery, they suggest in a report in the *Journal of the American Chemical Society*, is an advance toward medical use of simple plastic particles custom tailored to fight an array of troublesome "antigens." Those antigens include everything from disease-causing viruses and bacteria to the troublesome proteins that cause allergic reactions to plant pollen, house dust, certain foods, poison ivy, bee stings and other substances.

In the report, Kenneth Shea, Yu Hosino, and colleagues refer to previous research in which they developed a method for making plastic nanoparticles, barely 1/50,000th the width of a human hair, that mimic natural antibodies in their ability to latch onto an antigen. That antigen was melittin, the main toxin in bee venom.

They make the antibody with molecular imprinting, a process similar to leaving a footprint in wet concrete.

The scientists mixed melittin with small molecules called monomers, and then started a chemical reaction that links those building blocks into long chains, and makes them solidify. When the plastic dots hardened, the researchers leached the poison out. That left the nanoparticles with tiny toxin-shaped craters.

Their new research, together with Naoto Oku's group of the University Shizuoka Japan, established that the plastic melittin antibodies worked like natural antibodies.

The scientists gave lab mice lethal injections of melittin, which breaks open and kills cells. Animals that then immediately received an injection of the melittin-targeting plastic antibody showed a significantly higher survival rate than those that did not receive the nanoparticles. Such nanoparticles could be fabricated for a variety of targets, Shea says.

"This opens the door to serious consideration for these nanoparticles in all applications where antibodies are used," he adds.

More information: "Recognition, Neutralization, and Clearance of Target Peptides in the Bloodstream of Living Mice by Molecularly Imprinted Polymer Nanoparticles: A Plastic Antibody", *Journal of the American Chemical Society*.

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