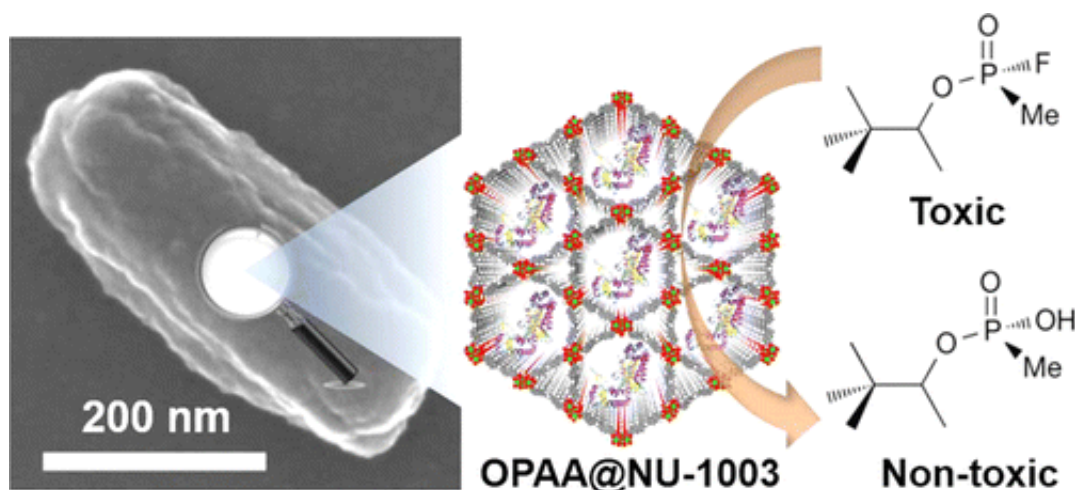


# A nerve agent antidote that could be taken before an attack

October 5 2016



Credit: American Chemical Society

Nerve agents are molecular weapons that invade the body and sabotage part of the nervous system, causing horrific symptoms and sometimes death within minutes. Few antidotes exist, and those that do must be administered soon after an attack. But now scientists report in the journal *ACS Nano* an early-stage development of a potential treatment that soldiers or others could take before such agents are unleashed.

One particular antidote, an enzyme called organophosphorus acid anhydrolase (OPAA), has attracted attention recently for its ability to break down [nerve agents](#). But the body's immune system gets rid of it quickly. Packaging the enzyme in liposome nanocarriers gives the

antidote greater staying power, but handling and storing the liposomes is complicated. So Omar K. Farha and colleagues wanted to make a potentially simpler carrier.

For a material, the researchers turned to porous metal-organic frameworks (MOFs), a class of hybrid materials made of metallic ions and organic ligands that are easy to store and handle at room temperature. They used a zirconium-based MOF and loaded it with the antidote. Testing showed the MOF-encapsulated enzyme was even more effective at breaking down the nerve agent simulant diisopropyl fluorophosphate and the nerve agent soman than the antidote by itself.

**More information:** Peng Li et al. Nanosizing a Metal–Organic Framework Enzyme Carrier for Accelerating Nerve Agent Hydrolysis, *ACS Nano* (2016). [DOI: 10.1021/acsnano.6b04996](https://doi.org/10.1021/acsnano.6b04996)

### **Abstract**

We report the synthesis and characterization of a water-stable zirconium metal–organic framework (MOF), NU-1003, featuring the largest mesoporous aperture known for a zirconium MOF. This material has been used to immobilize the nerve agent hydrolyzing enzyme, organophosphorus acid anhydrolase (OPAA). The catalytic efficiency of immobilized OPAA in nanosized NU-1003 is significantly increased compared to that of OPAA immobilized in microsized NU-1003 and even exceeds that of the free OPAA enzyme. This paper highlights a method for rapid and highly efficient hydrolysis of nerve agents using nanosized enzyme carriers.

Provided by American Chemical Society

Citation: A nerve agent antidote that could be taken before an attack (2016, October 5) retrieved

24 April 2024 from <https://phys.org/news/2016-10-nerve-agent-antidote.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.