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Scavengers of Organophosphorus Compounds Based on Catalytic Antibodies

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Since September 2007, investigators from France, Russia and the United States have worked to develop catalytic scavengers based on antibodies for use against organophosphorus compounds. This project envisions the creation of a new class of antibody-based biotherapeutics for protection or intervention against organophosphorus nerve agents (OPCs), such as sarin and VX. Unprotected civilian populations are highly vulnerable to localized attacks using these agents. Victims may suffer convulsions, paralysis, respiratory failure and death. Current treatments or antidotes consist of chemicals which must be injected immediately after exposure, and their duration is short-lived. Human antibodies are well suited as biotherapeutics for applications in which the target antigen is known. In the case of reactive substances such as OPCs, antibodies could be generated which bind and sequester the small molecules in the blood or at mucous membranes. The new technology of catalytic antibodies offers the possibility of generating antibodies that react chemically with the antigens, reminiscent of the way enzymes react with their substrates. The objectives of the project are to evaluate various candidate antibodies and to develop an optimal reactive antibody for use in humans. The project will use molecular technologies to “select” antibodies from in vitro “libraries”, thus avoiding the need to immunize animals against lethal toxins such as Sarin in order to generate antibodies. Unique methods for selecting reactive or catalytic antibodies have been elaborated for very similar compounds, suggesting that the project goals are eminently feasible.

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