Summary:
Ricin toxin (RT) is one of the most potent biological toxins known, capable of causing death in humans following injection, inhalation, or ingestion. The toxin is found naturally in castor beans (Ricinus communis), which are cultivated on an industrial scale around the globe for oils used in the manufacturing of cosmetics, industrial lubricants, and biofuels. Ricin constitutes approximately 5% of the dry weight of a castor bean and can be easily extracted and purified in a highly toxic form. Its availability, coupled with its extreme toxicity, makes ricin a biothreat agent both in the US and abroad. To date, there is no marketed vaccine (or therapeutic, for that matter) to combat the effects of ricin exposure.

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Benefits:
A significant problem encountered with the development of candidate ricin vaccines in development have been their relatively weak elicitation of toxin neutralizing antibodies (TNA). Since a ricin vaccine would be approved via the Food and Drug Administration’s animal rule, elicitation of TNA in relevant animal models is paramount to the approval (and presumed real-world success) of the vaccine. A second problem associated with such vaccines have been their moderate conformational stability—a problem derived from the inherent instability of Ricin A chain. To overcome these problems, KU researchers have designed four mutant versions of a candidate recombinant ricin A chain subunit vaccine antigen that elicit significantly more robust TNA response than the candidate vaccine in clinical trial in which they are based.

Applications:
Use as a vaccine for protection against ricin exposure.

How it Works:
Through the use of computational protein design, the invention discloses four mutant versions of the candidate vaccine antigen that improve the rate and extent of neutralizing antibody elicitation as well as the stability of the vaccine antigen. These traits are beneficial on a variety of fronts. Due to the increased stability of the antigen, it may be possible to store it for longer periods of time. Most importantly, the invention raises neutralizing antibodies faster and to a greater extent than the candidate vaccine antigen, which unquestionably leads to a better vaccine from an immunological standpoint.

Why it is better:
The stabilized ricin A chain mutants presented elicit high neutralizing antibody titers.

Patents:
Patent pending.

Additional Web Content:
Contact the inventor, John Karanicolas