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Rapid, Large-Scale Plant-Based Production of Catalytic Nerve Agent Bioscavengers

AzTE Case # M11-123L

Inventors

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Invention Description

Several human proteins have the capacity to act as bioscavengers to bind and remove different toxic compounds and drugs. For example, bioscavenging of organophosphate (OP) by human proteins is emerging as a promising medical intervention for prophylaxis and post-exposure treatment against chemical warfare nerve agents and pesticides. The best-studied bioscavengers are human cholinesterases (ChEs), which are highly efficient in binding and sequestering OPs. However, they are also inactivated by these toxins, thus requiring administration of large amounts for full protection.

Researchers at the Biodesign Institute of Arizona State University have developed a novel method to produce human ChE-based recombinant catalytic bioscavengers in tobacco plants. The tobacco plants are infected with plant virus-based expression vectors, permitting production of research-scale quantities of bioscavenger enzymes for screening purposes. This method also provides an easily-scalable production platform enabling the biomanufacturing of clinical lots.

Potential applications include first-responder and clinical use for pesticide poisoning, and as an anti-nerve agent in the medical arsenal of the DoD and Homeland Security.

Potential Applications

- Treatment of OP pesticide poisoning, both acute and chronic
- Treatment for exposure to OP-based nerve agents
- Treatment for post-operative apnea
- Treatment for cocaine overdose

Benefits and Advantages

- Production method amenable to research-scale quantities, yet easily scalable
- Sustainable, plant-based supply

Intellectual Property Status:

Patent Pending

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