Katie F Glenn et al., J Proteomics Bioinform 2015, 8:10
http://dx.doi.org/10.4172/0974-276X.C1.080

OMICS International
conferenceseries.com

International Conference on

Protein Engineering

October 26-28, 2015 Chicago, USA

Protein engineering of *Roultella planticola* organophosphorus acid anhydrolase (OPAA) for hydrolysis of organophosphorus nerve agents

Katie F Glenn, Om V Singh and **Steven P Harvey**
Edgewood Chemical Biological Center, USA

Chemical nerve agent toxicity is due to the inhibition of acetylcholinesterase leading to a loss of muscle control and eventual death from asphyxiation. The use of catalytic enzymes for detoxification would allow for nerve agent hydrolysis in the bloodstream prior to reaching acetylcholinesterase in tissue. Additionally, enzymes can be used synergistically with existing nerve agent treatments that include acetylcholinesterase re-activators and stoichoimetric binding materials but currently provide only a few LD_{50}s of protection. Since enzyme activity is often specific, hydrolysis of all relevant nerve agents most likely will not be achieved through the use of a single enzyme. Phosphotriesterase (PTE) and organophosphorus acid anhydrolase (OPAA), two enzymes of bacterial origin, have been shown to possess hydrolytic activity against nerve agents. Protein engineering of PTE has improved catalytic efficiencies for various substrates however there are still nerve agents for which PTE shows little or insufficient activity. Because OPAA has little homology with PTE, it provides a completely complementary approach for protein engineering. Cell extract from the ultraviolet-radiation-resistant extremophile *Roultella planticola* shows some hydrolytic activity towards the most toxic of nerve agents (V-type nerve agents) for which improved activity is still needed by existing PTE and OPAA mutants to achieve catalytic activity suitable for bloodstream detoxification (target value of about 10^7 $M^{-1}min^{-1}$). Here we describe the initial purification, characterization and ultimate exploitation of recombinant *Roultella planticola* OPAA for protein engineering studies to improve V-type nerve agent hydrolysis activity.

Biography

Katie F Glenn has completed her PhD in Biochemistry and Molecular Biology from Clemson University, SC and previously has completed a Master's in Chemistry from the University of South Carolina. She is currently working as a National Research Council Post-doctoral Fellow performing research for the US Army at the Edgewood Chemical Biological Center.

kglenn456@gmail.com

Notes: