OMICS Group Conferences
Accelerating Scientific Discovery

3rd International Conference on
Biomarkers & Clinical Research

July 2-4, 2012 Embassy Suites Las Vegas, USA

Biomarkers of human organophosphorus exposure: A mass spectrometric analysis

Judit Marsillach
Depts. of Medicine (Div. Medical Genetics) and Genome Sciences, University of Washington, USA

Organophosphates (OPs) are widely used as insecticides, nerve agents, and oil additives. OPs are one of the most common causes of poisoning as they can inhibit cholinesterases and other serine active site enzymes by forming a covalent bond to the active-site serine, causing a variety of adverse health effects. Butyrylcholinesterase (BChE) is a known biomarker of OP exposure. The current biomonitoring protocols for identifying OP exposures rely on measuring the inhibition of BChE activity. Difficulty in obtaining accurate baseline measurements for individuals and variation of BChE activitiy over time are major drawbacks. Given that OPs modify the active-site of their target enzymes by adding phorphoryl groups, the identification of these adducts would be a much more reliable approach. We have developed a novel method using a mass spectrometric (MS)-based approach with an initial focus on BChE. The method consists of a rapid purification of BChE from plasma using a single-step immunomagnetic bead-based protocol followed by analysis of BChE chymotryptic peptides by high-resolution MS to identify the OP-adducted active-site serine. The protocol has been validated with plasma samples from agricultural workers during the insecticide spraying season. The limit of detection for our proteomics approach is around 2% modification, higher than the current enzyme activity measurements used for the biomonitoring program (around 20% inhibition). This general approach is adaptable for high-throughput and can be used to characterize OP modification of other biomarker proteins as well as determine the nature of the OP exposure.

Biography

Judit Marsillach is currently a senior postdoctoral fellow at the University of Washington (Seattle, USA). She completed her PhD at the age of 25 years from Rovira i Virgili University (Reus, Spain). Her research is focused mainly on the identification and characterization of biomarkers of organophosphorus exposure. Other fields of interest include the study of the structure and function of paraoxonase-1, and its protein-protein interactions. She is member of the Society of Toxicology and has published more than 40 papers in reputed journals.

jmarsi@uw.edu