UNIVERSITY OF RHODE ISLAND
Department of Chemistry
SEMINAR

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"Analysis of Biomedical Samples for Determination of Exposure to Chemical Warfare Nerve Agents"

HOST

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Analysis of Biomedical Samples for Determination of Exposure to Chemical Warfare Nerve Agents

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Although the use of chemical warfare nerve agents (CWNA), such as sarin and VX is forbidden by the Chemical Weapons Convention (CWC), documented cases of the use of these nerve agents exist. In cases of alleged CWNA use, the CWC provides for the collection of both environmental and biomedical samples from human or animal sources. Biomedical sample analysis differs from environmental testing in that biological markers of exposure to CWNA are most likely to be present in blood, urine, or tissue at levels in the low parts per billion range or lower. At these trace levels targeted analysis is required employing analytical techniques such as mass spectrometry in selected ion monitoring or multiple reaction monitoring modes combined with gas or liquid chromatography.

Currently, nerve agent exposure can be verified by targeting metabolites, such as the alkyl methylphosphonic acid hydrolysis products, reactivated nerve agents, and nerve agent adducts with macromolecules, such as proteins. While multiple methods have been employed for retrospective nerve agent detection, in our laboratory we employ primarily a fluoride ion regeneration protocol with GC-MS/MS analysis using isotope dilution.

The focus of this presentation is to provide an overview of the evaluation of biomedical samples for determining the presence of chemical warfare nerve agents and detail the results of sample analyses from two separate projects assessing developmental effects in rats following exposure to sarin via an inhalation route and exposure to VX via a percutaneous route.

BIOGRAPHY
Jeffrey M. McGuire

Jeff is currently a Chemist with the Edgewood Chemical Biological Center in Maryland, which is part of the U.S. Army's Research Development and Engineering Command. Jeff began his career with Hercules, Incorporated following completion of his Master's degree at the University of Delaware under the tutelage of Professor Burnaby Munson. While at Hercules, Jeff worked in the mass spectrometry laboratory providing support to R&D efforts, field sales personnel, and plant and operations managers. Following his departure from Hercules, he joined the federal workforce at ECBC where he is currently responsible for analytical methodology development as applied to the separation and detection of low to ultra-low concentrations of chemical warfare agents in various biological matrices. Jeff has authored and coauthored several publications ranging from the characterization of ester gums to determining the pharmacokinetics of the stereoisomers of VX nerve agent. Jeff currently resides with his wife in Wilmington, Delaware where he enjoys an occasional round of golf on weekends.