First Quarter Report to the Midwest Forensics Resource Center

1. Fast Gas Chromatography Capabilities in Drug Identification

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3. First Quarterly Progress Report: January 1, 2011 – March 31, 2011

4. Project Description:

Fast gas chromatography with hydrogen mobile phase (Fast GC-H_2) enables significant increases in sample throughput, chromatographic resolution, and budget savings in drug identification involving GC separations. Peer-reviewed research in Fast GC and recent work by the PI with Fast GC-H_2 in ignitable liquid identification demonstrates significant improvements in each listed figure of merit. These benefits should translate to Scheduled compound analysis by Fast GC-H_2. This work will assess Fast GC-H_2 in drug identification, provide data for the use of H_2 in GC-MS, and create webinar modules and discussion networks for laboratory personnel to discuss the potential implementation of Fast GC-H_2

5. Project Objectives:

The objectives of the project are three-fold:

1) assess the primary impact of Fast GC and hydrogen carrier gas usage in the area of drug identification as each aspect may provide a substantial time savings per analysis,

2) explore the limitations that Fast GC may place on MS signal collection;

3) create webinars for a more robust dissemination of meritorious results from Fast GC in drug analysis as well as the capabilities of hydrogen carrier gas in GC-MS instruments with one area of interest being safety issues.

6. Current Status/Results

a) Progress to date:

Work in the first quarter was primarily theoretical in nature and focused on the question of to what extent the quadrupole mass spectrometer limits the speed of the Fast GC separation. In short, the concern was based in data collection by the MS unit. The potential problem was that, if the method used pushes a particular analyte through the MS too quickly (given the incredible narrow analyte bands in particularly aggressive Fast GC methods), there could be a loss of signal relative to noise. This may have led to a decrease in sensitivity; however, discussions with Agilent representatives and calculations demonstrate that the current (post 5972) MS units will not be a limiting factor in our process.

The PI has also initiated the webinar design by discussing the construction of these modules with University of Wisconsin-Platteville media services.

b) Work that lies ahead:

Given that the PI is an academician in a comprehensive university, the bulk of this project's work will be occurring late in the second and extensively in the third quarter of the year. This means that the bulk of the work lies ahead.

Experimental design will focus on GC method reproduction on the Fast GC unit and progress into experiments assessing the limits of Fast GC in drug identification compared to conventional means using the UWP Fast GC with helium so as to test the ascertain the potential benefit for a crime lab reluctant to adopt hydrogen as a carrier. The second experiment will reverse this and characterize the benefit of hydrogen carrier gas without also switching to Fast GC in the event that a crime lab does not have access to a Fast GC conversion kit. The final experimental phase will examine how much further Fast GC can be pushed when coupled with the hydrogen.

A student employee/intern has been selected to work on the project beginning June 6, 2011.