VUV ANALYTICS

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Emerging Drugs of Abuse Executive Roundtable
Wednesday, June 6, 2018
IUPUI, Indianapolis, IN

Roundtable Participants

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Key Topics of Discussion

- Peer-to-peer discussion of challenges in seized drug analysis and regulations including tactics being employed by researchers to more rapidly and accurately identify synthetic drugs of abuse such as fentanyl isomers, synthetic cathinones, synthetic cannabinoids and other emerging drugs
- Sharing of best practices to overcome limitations of existing technology
- How to raise awareness of innovations in analytical technology and its potential benefits to law enforcement

Presentations

"Decreasing the Uncertainty of Peak Assignments for the Chromatographic Separation of Emerging Drugs", Dr. Ira Lurie, The George Washington University

"Analytical Challenges in Identifying Structural Isomers of Drugs", Dr. John Goodpaster, IUPUI

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Peer-to-peer discussion of challenges in seized drug analysis and regulations

- Different departments/jurisdictions/states, etc. have different procedures for analysis based upon laws guiding the laboratory requirements.
    - Indianapolis-Marion County used to complete quantitative analyses because they supported the federal agencies like DEA, but IN and IL state labs are qualitative since state agencies do not require quantitative results.
    - No real standard methods industry-wide, or scripts for how to handle a seized sample of completely unknown matrix – most start with color analysis
- Identification is everything
    - 250 fentanyl variations seen
    - Variable and messy matrix – some seized bags contain 15 different drugs
    - How to identify if coeluting peaks are not resolved chromatographically or by traditional detection methods?
- Increased workload is challenging
    - Some labs seeing double sample submissions in past year or two
    - Unable to really evaluate new technology – slow adoption historically due to budget cycles; will be hard to adopt now due to workload
    - Safety of lab personnel always a concern – increased PPE slows work cycle down

Sharing of best practices to overcome limitations of existing technology

- SWGDRUG Methods of Analysis/Drug Identification recommendations followed
- GC-MS commonly used
    - Most labs in attendance do not run standards each day when samples are analyzed because they are not using retention time for peak identification
    - Will run secondary test such as TLC as confirmation
    - Dr. Lurie recommended running a standard each day, much discussion followed

How to raise awareness of innovations in analytical technology and its potential benefits to law enforcement

- Labs adopting GC-DiscovIR
    - Qualitative analysis
    - IL State Police just placed PO for a system, and IN State Police has one
    - OH and VA labs early adopters
- Adoption process involves published journal articles by respected researchers, on-site demos in the laboratories with street samples, and selected technology spreads by word-of-mouth throughout forensics community worldwide, and then adopted into legal cases.
    - Everything on fentanyl backbone is now controlled on federal level
    - 18 different classes of cannabinoids in IL
    - Language on fentanyls presented by attorneys in IL ignored so far
- Dr. Lurie recommends GC-VUV-MS with Cold EI (retention, VUV, MS – with quantitation)
    - GC-VUV is complementary technique to MS useful for differentiating positional isomers, deconvoluting coeluting peaks and quantitative analysis
    - Measures vibronic transitions in 120-240nm range
    - VUV and UV should at least be a category B SWG Drug test
- Dr. Lurie also uses and recommends UHPSFC
    - Comparable LOD and robustness to UHPLC
    - Normal phase separations with greener mobile phase
    - Excellent for separation of positional and stereoisomer

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    - UHPSFC being added to SWG Drug test as category B
- Dr. Goodpaster is interested in increasing specificity of analytical determinations utilizing GC-VUV and getting structure-based laws passed by encouraging active participation of chemists in writing the legislation
    - GC-MS sensitive, selective and specific for most, but not all compounds
        - EI mass spectra, Category A – suffers "tyranny of ethyl cleavage"
        - MS fragmentation patterns mean several isomers cannot be distinguished
    - Structure-based control laws in IN and IL
        - Pass laws that control a "family" of compounds that is sufficiently specific to target the drugs of abuse yet avoid controlling everything
    - OH has structure-based law for fentanyl
    - GC-VUV NIJ Award 2017-R2-CX-0018
        - Lab measuring characteristics of VUV detector with cinnamaldehyde as model compound

Summary

- 24 attendees including VUV Analytics' personnel
- Tours of IUPUI's teaching labs and Dr. Goodpaster's research lab was attended by entire group
    - Dr. Goodpaster's student Zackery showed their Agilent GC with VGA-101 detector and VUVision software set-up to attendees
- All attendees stayed for lunch on campus at Chancellor's Restaurant where discussions continued

Dr. Ira Lurie presenting

Dr. John Goodpaster presenting

IUPUI teaching lab

Zackery Roberson presenting VUV detector