The 2007 "Research on Drug Evidence" Report

[From the 15th ICPO / INTERPOL Forensic Science Symposium]

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ABSTRACT: A reprint of the 2007 "Research on Drug Evidence" Report (a review) is provided.

KEYWORDS: INTERPOL, Illicit Drugs, Controlled Substances, Forensic Chemistry.

Important Information:

Presented at the 15th ICPO / INTERPOL Forensic Science Symposium, Lyon, France, October 23 - 26, 2007.

For pertinent background, see: Klein RFX. ICPO / INTERPOL Forensic Science Symposia, 1995 - 2016. "Research on Drug Evidence". Prefacing Remarks (and a Request for Information). Microgram Journal 2016;13(1-4):1-3.

Citations in this report from the *Journal of the Clandestine Laboratory Investigating Chemists Association* were (and remain) Law Enforcement Restricted.

The "General Overview" (Talking Paper) was removed from this reprint (Editor's discretion).

This reprint is derived from the original electronic document, and is *not* an image of the best available hard copy (as was utilized for the 1995 and 1998 reports). For this reason, the pagination in the Proceedings is not retained in this reprint; in addition, minor corrections were made, (where present) "contact information" was removed, and some minor reformatting was done to eliminate deadspace. All widow and orphan lines were left as is. The references in this review were not numbered in the original document. The journal titles may be in complete or abbreviated forms, and the listed page(s) may be only the first page or the entire range (the titles and page(s) duplicate what was provided in the respective abstract).

Research On Drug Evidence
July 1, 2004 - June 30, 2007

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Notes:

1. All categories are subdivided by topic or category, then alphabetically by the first author's last name.
2. Where appropriate, a short explanatory note is added to the citation to provide additional detail concerning the reference.
3. Note that the following reference is law enforcement restricted, and is not available to the general public: The *Journal of the Clandestine Laboratory Investigating Chemists Association* (all years).

I) Routine and Improved Analysis of Abused Substances

Issue:

Improved methods of analysis, i.e., faster, more discriminatory, more sensitive, less costly, etc., are needed for all abused substances. Additionally, standard analytical data are required for previously unknown or rarely encountered substances and/or new homolog or analog (i.e., "designer"-type) drugs.

Solution:

Drug seizures and clandestine laboratory operations are continuously monitored to provide a comprehensive overview of new developments. Ongoing research in the forensic community, as well as in the general field of analytical chemistry, provide new and/or improved methods of analysis for both routine and specialized analyses of seized drugs. Reports providing standard analytical data for new drugs of abuse and/or improved analytical protocols for known drugs of abuse are generated for the forensic and enforcement communities.

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Reviews:

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amphetamine and its N-alkyl-substituted derivatives with micro- and mesoporous adsorbents in polar liquids. Journal of Colloid and Interface Science 2004;282(2):261. [The title technique is used to concentrate amphetamines from "dilute aqueous solutions" (may be biological fluids - not clear in abstract).]

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flumazenil, zaleplone, zolpidem, and zopiclone in plasma by liquid chromatography/mass spectrometry with atmospheric pressure chemical ionization. Journal of Mass Spectrometry 2004;39(8):856. [The focus is toxicological.]

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II) Synthesis and/or Cultivation of Abused Substances, their Precursors, and Essential Chemicals

Issue:

Forensic chemists must maintain familiarity with existing and new clandestine syntheses of abused substances, their precursors, and essential chemicals, and with the cultivation of abused natural products, in order to assist enforcement activities, to ensure safety and effectiveness during enforcement operations, and to provide expert testimony in legal proceedings.

Solution:

Illicit drug seizures, clandestine laboratory operations, and illicit grow operations, are continuously monitored to maintain a comprehensive overview of the field. In cases where new drugs are synthesized, or new methodologies are utilized, case reports are generated for the forensic and enforcement communities.

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---------- Next Section Moved Up to Reduce Deadspace ----------

III) Clandestine Laboratories - Appraisals and Safety

Issue:

Forensic chemists must maintain familiarity with clandestine laboratory procedures, setups, and techniques in order to assist enforcement activities, to ensure safety and effectiveness during enforcement operations, and in order to provide expert testimony in court proceedings.

Solution:

Clandestine laboratory operations are continuously reviewed to provide a comprehensive overview of the field. In cases where new methodologies are noted, or unusual safety concerns are salient, reports are generated for the forensic and enforcement communities.

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---------- Next Section Moved Up to Reduce Deadspace ----------

IV) Reference Drug Standards and Total Syntheses

Issue:

Many reference drug standards or structurally related internal standards are either commercially unavailable, or if available are extremely expensive.

Solution:

Controlled substances and their structural or isotopically labelled analogs are synthesized as needed. Internal standards are also prepared as needed. Case reports are published for new or unusual standards or improved synthetic approaches.

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V) Source Determination of Drugs (Impurity Profiling) and Comparative Analyses

Issues:

Impurity profiling of drugs is important for comparative analysis protocols, geo-sourcing, and synthetic route determinations. However, although certain drugs have been well characterized with respect to their impurity profiles, most have not been properly investigated.

Comparative analysis (i.e., the systematic application of impurity profiling for determination of commonality of origin) is complicated due to both the high complexity of the data and the large numbers of exhibits. Improved analytical and data handling techniques are needed.

Solution:

High sensitivity analytical techniques (primarily chromatographic) provide detailed profiles of trace-level impurities, ions, trace metals, and stable isotopes. Identification of individual impurities enhance origin identification and comparative analyses and also aid in development of internal standards for improved accuracy and precision of analysis.

In-depth analysis via improved instrumental methodologies help identify discriminatory components in impurity profiles. Computer databases, sorting programs, and pattern recognition/neural networks provide enhanced data handling and analysis, enabling and improving comparative analyses. Case reports are generated for the forensic and enforcement communities.

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VI) Analysis of Non-Controlled Pharmaceuticals, Pseudo-Drugs, Adulterants, Diluents, and Precursors

Issue:

Most "street-level" drugs are "cut" with various adulterants and diluents. Many of these cutting agents are pharmaceutical products or precursors. Others are "carry-through" compounds present in precursors (especially in cold remedy products). Separation and identification of these extraneous materials can be tedious, especially in exhibits which contain many components. In addition, new or unusual adulterants and/or diluents are occasionally identified in drug exhibits, and standard analytical data are required for these substances. Finally, improved methods of analysis, i.e., faster, more discriminatory, less costly, etc., are needed for all cutting agents.

Solution:

Reports providing standard analytical data and/or improved analytical protocols for non-controlled pharmaceuticals, pseudo-drugs, adulterants, diluents, and precursors are generated for the forensic and enforcement communities.

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VII) New and/or Improved Instrumental Techniques

Issue:

Forensic Chemists must maintain familiarity with updates in current instrumental techniques and become versant in new, improved methods of analysis.

Solution:

Improved/existing and new technologies are reviewed and applied to both routine and specialized analyses of drugs. In cases where improved performance is observed, case reports are generated for the forensic community.

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---------- Next Section Moved Up to Reduce Deadspace ----------

VIII) Portable Detection and Analytical Instrumentation

Issue:

"Free Trade" agreements and the easing of formally restrictive national and international borders have resulted in dramatic increases in cargo transshipments and personal travel, thereby complicating drug inspection and interdiction efforts at POEs. Discovery and confirmational analysis of suspected drugs in cargo or on individuals is severely hampered by the lack of on-site detection and/or analytical equipment.

Solution:

Development of portable and highly sensitive detectors for drug detection and analyses allows law enforcement personnel and/or forensic chemists to perform screening type analyses on-site. In those cases where new methodologies have proven effective, case reports are generated for the forensic and enforcement communities.

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