B82 Assessing the Quality and Reliability of Drug Identifications

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After attending this presentation, attendees will better understand how to evaluate laboratory data to obtain information on the quality of drug identifications.

This presentation will impact the forensic science community by providing an approach for estimating the quality and uncertainty of drug identifications in the forensic chemistry laboratory.

The Drug Enforcement Administration (DEA) laboratory system processes thousands of suspected drug exhibits every year, seized by federal, state, and local law enforcement officials during undercover operations and via interceptions of drug smuggling operations, among others. After laboratory analysis, results are summarized in official laboratory reports that are forwarded to the submitting investigative agency. Many of these laboratory reports are then used by government officials during court trials and sentencing procedures and, as such, should present accurate and scientifically supported results and conclusions, as incorrect decisions based on inaccurate reports could have significant legal and personal consequences. Laboratory reports and case documentation should also fulfill laboratory accreditation requirements and provide users in the judicial system, such as attorneys and jurors, with information regarding the quality of laboratory processes and resulting drug identifications.

The DEA laboratory drug identification process is separated in to three phases. Phase I includes evidence submission and Chain-Of-Custody (COC) procedures such as barcoding, secure vault storage, and safety protocols. Phase II forms the core of the laboratory identification process, as it incorporates the analytical scheme — the combination of sampling protocols and tests performed by expert analysts in order to achieve an unambiguous and scientifically supported identification. Phase III includes preparation of the final laboratory report by the analyst, and the technical and administrative reviews performed by laboratory managers. These peer-review steps ensure that analytical scheme requirements have been met, that identification results are accurately reported, and that the analytical case file contains all the documentation required to support the identification.

Even when best laboratory practices are in place and the appropriate analytical scheme is followed, the extensive series of laboratory procedures required to report a final identification may be susceptible to errors. Many of these errors are unforeseen or unanticipated and may occur during instrument operation, sample handling, and during the report-writing stages, among others. Consequently, the possibility of reporting a misidentification is always present. It is therefore crucial to assess the performance of a laboratory's identification procedure so that the quality of reported identifications can be described and communicated to the report recipients. This will undeniably result in a better understanding of the frequency of procedural errors and will help to evaluate and improve quality assurance measures throughout laboratories.

This presentation will include results from the evaluation of historical DEA laboratory system-wide Proficiency Testing Program (PTP) data obtained during the years 2005-2016. Analysis of this data provides estimates of the sensitivity (true positive rate) and specificity (true negative rate) of the DEA drug identification process, as well as estimates of the probabilities associated with Type I and Type II errors (false positive and false negative rates, respectively). This presentation will also demonstrate how Bayesian analysis can be used, in combination with the

response rates, to evaluate the confidence and uncertainty associated with identification results. The PTP data and its evaluation and discussion will demonstrate that the DEA identification process is highly sensitive and specific, with rates of type I and type II errors below 1%.

Criminalistics, Seized Drugs, Identification