B171   Challenges for Implementing a New Paradigm in Fire Debris Analysis and Reporting

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After attending this presentation, attendees will understand the challenges of moving from categorical statements to statements of quantifiable evidentiary value in fire debris data interpretation.

This presentation will impact the forensic science community by demonstrating a methodology for assessing and presenting statements of quantifiable evidentiary value in fire debris analysis.

The American Society for Testing and Materials (ASTM) E1618-14 (Section 12) allows for reporting the presence or absence of ignitable liquid residue using a variety of terminology; however, "Note 5" stipulates that "[R]regardless of the choice of phrases used, there is no implied difference in the perceived level of confidence for a positive result."[1] The E1618-14 standard establishes subjectively determined dichotomous categorical statement(s) and explicitly rejects the concept of evidentiary value. This approach is not congruent with current trends in forensic science.

Many disciplines of forensic science have come under pressure to replace subjective methods and categorical conclusions with objective methods and/or statements that reflect statistical and quantifiable results. Popular ways to address this problem include the use of random match probabilities, likelihood ratios, and verbal equivalents to express the results in language that a lay jury can understand. Recent research in criminal justice and the social sciences have shed some light on the effectiveness of these three methods.[2,3] The approach that has been endorsed by the European Network of Forensic Institutes in their 2015 guideline on evaluative reporting involves the use of likelihood ratios in a Bayesian framework to express evidentiary value as a verbal scale which is tied to the likelihood ratio.[4] There are many challenges to implementing a likelihood ratio approach with verbal equivalents of evidentiary value in forensic fire debris analysis. This presentation will introduce the fundamental concepts of the approach and the benefits as well as the challenges that must be overcome to implement the approach. Topics addressed will include the need for specialized software, standard data sets, and accessible training.

Reference(s):

1. ASTM Test method for ignitable liquid residues in extracts from fire debris samples by gas chromatography – mass spectrometry (E1618-14)." American Society for Testing and Materials, 2014.
2. Thompson W.C., Newman E.J. Lay Understanding of Forensic Statistics: Evaluation of Random Match Probabilities, Likelihood Ratios, and Verbal Equivalents. *Law and Human Behavior* 2015:39(4):332 – 349.
3. Friedman O., Turri J. Is Probabilistic Evidence a Source of Knowledge, *Cognitive Science* 2015:39: 1062 – 1080.
4. Willis S. ENFSI Guideline for Evaluative Reporting in Forensic Science. Strengthening the Evaluation of Forensic Results across Europe (STEOFRAE)." accessed online, 2015 (July), http://www.enfsi.eu/sites/default/files/afbeeldingen/enfsi_booklet_m1.pdf.

Fire Debris, Evidentiary Value, Bayesian Statistics