



# NATIONAL COMMISSION ON FORENSIC SCIENCE

**NIST**  
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Standards and Technology  
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## Establishing the Foundational Literature within the Forensic Science Disciplines

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### **Subcommittee**

Scientific Inquiry and Research

### **Type of Work Product**

Views Document

### **View**

It is the view of the NCFS that scientific literature must be evaluated and be vetted through an objective and critical review process using tenets based on general scientific principles and practice. These tenets must be satisfied before any form of scientific literature is included in, and considered part of, a forensic discipline's scientific foundation.

### **Statement of Issue**

Documentation of the literature that supports the underlying scientific foundation for each forensic discipline is a critical component in determining if methods, technologies, interpretation guidelines and conclusions are supported by science. Features of "scientific literature" are delineated in the approved Views Document "Scientific Literature in Support of Forensic Science and Practice;" it presented criteria by which scientific literature can be assessed for consistency with principles of scientific validity. However, meeting these criteria is only the first step in creating a compilation of core scientific literature within a field. Such compilations are vital to the forensic discipline as well as to the judicial system where it should be integral to admissibility and gatekeeping practices.

In any scientific discipline, an on-going process to evaluate the weight and merit of published materials must be established. The National Commission on Forensic Science (NCFS) is aware of past and on-going efforts to establish the scientific foundation of forensic discipline through literature reviews and generation of bibliographies. As part of these efforts, it is the view of the NCFS that scientific literature must be evaluated and be vetted through an objective and critical review process using tenets based on general scientific principles and practice. These tenets must be satisfied before any form of scientific literature is included in, and considered part of, a forensic discipline's scientific foundation.

### **Background**

Methods employed while conducting basic or applied research within a given scientific discipline may vary depending on several factors such as the size and scope of the research. Academic research often explores novel methodology and instrumentation and potential forensic science applications. Forensic science service providers frequently investigate ways to offer more expeditious, inexpensive analysis to their customers; accordingly, they conduct validation

studies of leading-edge analytical and technical procedures cited in the scientific literature or provide alpha and beta testing of kits, instruments and software. The studies performed usually will depend on the individual needs of the laboratory and not necessarily on those of the discipline where infrastructure, staffing and funding may be variable. Although publication of the studies is crucial, differences in approach, data collection, interpretation and presentation are inevitable. Regardless of where a research study falls on the range of basic to applied, the same general tenets of scientific review should be applied to the evaluation of resulting publications.

Evaluations of the literature using a universal systematic process will provide a means to determine which studies are truly foundational. As an on-going effort, these reviews will document the evolution of a given discipline with respect to the expectations outlined in the National Research Council Report on Forensic Science in 2009. Such an approach could allow for strengths and weaknesses of a given discipline to be discovered which could result in systematic exploration of these weaknesses through future research.

Compilations of accepted foundational literature serves additional purposes. First, compilations generated under stringent review criteria define general scientific acceptance and should be used to assist in admissibility decisions and gatekeeping functions. Second, priorities can be established for translational studies designed to bring the most promising developments into mainstream forensic practice. Third, research needs can be identified and used to develop initiatives and calls for proposals to fill these needs and to spur investigator-initiated research. Success in these endeavors depends on current and complete understanding of the foundational literature.

### **Recommended Implementation Strategy**

The purpose of this Views document is to provide guidance relevant to evaluating status of scientific literature for specific forensic science discipline. The following tenets of literature review should be considered in a critical review process that evaluates the merit of an individual article:

- Does the publication adhere to the guidelines stated in the Views Document “*Scientific Literature in Support of Forensic Science and Practice*”?
- Is the problem or hypothesis clearly stated?
- Is the scope of the article clearly stated as appropriate (article, case study, review, technical note, etc.)?
- Is the literature review current, thorough, and relevant to the problem being studied?
- Does this work fill a clear gap in the literature or is it confirmatory and/or incremental?
- Are the experimental procedures clear and complete such that the work could be easily reproduced?
- Are the experimental methods appropriate to the problem?
- Are the methods fully validated to the necessary level of rigor (fit for purpose)?
- Are the data analysis and statistical methodology appropriate for the problem, and explained clearly so it can be reproduced?
- Are the experimental results clearly and completely presented and discussed?
- Are omissions and limitations to the study discussed and explained?

- Are the results and conclusions reasonable and defensible based on the work and the supporting literature?
- Are the citations and references complete and accurate?
- Are the references original (primary) and not secondary?
- Are funding sources and other potential sources of conflict of interest clearly stated?

## Additional reading and references

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