OSAC RESEARCH NEEDS ASSESSMENT FORM

Title of research need: Best practices for reporting likelihood ratios or other probabilistic results in court

Describe the need:

The criminal justice system requires all positive associations of forensic unknowns to a probative reference sample to be accompanied by a meaningful statistical weight that is readily understood by jurors and the legal community. There are different approaches to derive statistical significance estimates for positive associations, most or all of which can be difficult to explain to a jury and/or a judge. Current thinking favors likelihood ratios and probabilistic genotyping results, especially for complex mixtures.

Research should target how forensic scientists can best present statistical weight based on likelihood ratios or other probabilistic statistics in an unbiased manner. Additionally, how this information is perceived by legal professionals and the jurors should also be evaluated. Research should include an assessment of the utility of verbal scales and evaluate the possible need for additional metrics and other tools to add context to a probabilistic value.

Keyword(s): Testimony, likelihood ratio, probabilistic statistics

Submitting subcommittee(s): Human Biology **Date Approved:** 05/04/2021

(If SAC review identifies additional subcommittees, add them to the box above.)

Background Information:

1. Does this research need address a gap(s) in a current or planned standard? (ex.: Field identification system for on scene opioid detection and confirmation)

It coincides and supports with standards that are in the review process

2. Are you aware of any ongoing research that may address this research need that has not yet been published (e.g., research presented in conference proceedings, studies that you or a colleague have participated in but have yet to be published)?

Yes

3. Key bibliographic references relating to this research need:

1) Arscott, E., Morgan, R., Meakin, G., & French, J. (2017). Understanding forensic expert evaluative evidence: A study of the perception of verbal expressions of the strength of evidence. *Science and Justice*, *57*(3), 221–227. http://doi.org/10.1016/j.scijus.2017.02.002

2) de Keijser J, Elffers H (2012) Understanding of forensic expert reports by judges, defense lawyers and forensic professionals. Psychology, Crime & Law 18(2):191-207. https://doi.org/10.1080/10683161003736744

3) Howes, L. M. (2015). The communication of forensic science in the criminal justice system: A review of theory and proposed directions for research. *Science & Justice*, *55*(2), 145–154. http://doi.org/10.1016/j.scijus.2014.11.002

4) Mullen, C., Spence, D., Moxey, L., & Jamieson, A. (2014). Perception problems of the verbal scale. *Science & Justice*, *54*(2), 154–158. http://doi.org/10.1016/j.scijus.2013.10.004

5) Taroni, F., Bozza, S., Biedermann, A., & Aitken, C. (2016). Dismissal of the illusion of uncertainty in the assessment of a likelihood ratio. *Law, Probability and Risk*, *15*, 1–15. http://doi.org/10.1017/CBO9781107415324.004

6) Thompson, WC, Newman, EJ (2015) Lay understanding of forensic statistics: Evaluation of random match probabilities, likelihood ratios, and verbal equivalents. Law and Human Behavior 39(4):332–349. https://doi.org/10.1037/lhb0000134

4. Review the annual operational/research needs published by the National Institute of Justice (NIJ) at https://nij.ojp.gov/topics/articles/forensic-science-research-and-development-technology-working-group-operational#latest? Is your research need identified by NIJ?

No

5. In what ways would the research results improve current laboratory capabilities?

Scientific results in a criminal case need to be communicated completely, clearly, with appropriate statistical weight, and in a fashion that is not misinterpreted by legal professionals and jurors. Best practices on how to communicate statistical relevance, specifically using complex concepts such as likelihood ratios or other probabilistic statistics would support laboratories and make report writing and testimony more effective and easily comprehensible.

6. In what ways would the research results improve understanding of the scientific basis for the subcommittee(s)?

The Human biology subcommittee is interested in how DNA results requiring likelihood ratios and probabilistic statistical evaluation are perceived by criminal justice stakeholders and jury members. This borders on cognitive science but is directly relevant to our field as well as to other fields of forensic science who are also evaluating probabilistic approaches

7. In what ways would the research results improve services to the criminal justice system?

Scientific results in a criminal case need to be communicated completely, clearly, with appropriate statistical weight, and in a fashion that is not misinterpreted by legal professionals and jurors. Best practices on how to communicate statistical relevance would help prevent the misinterpretation/ misrepresentation of data in court and improve the ratio of justified versus wrongful convictions.

8. Status assessment (I, II, III, or IV): II

	Major gap in current knowledge	Minor gap in current knowledge
No or limited current research is being conducted	I	III
Existing current research is being conducted	II	IV

This research need has been identified by one or more subcommittees of OSAC and is being provided as an informational resource to the community.