OSAC RESEARCH NEEDS ASSESSMENT FORM

Title of research need:	Development and validation of proteomic reference standards and materials for instrument system suitability check standards, internal standards, and positive controls
Describe the need:	Reference standards and materials are critical to ensure proper functioning of both liquid chromatography (LC) and mass spectrometry (MS) instruments, as well as for sample processing and analysis. These reference standards and materials consist of three main categories: instrument system suitability check standards, internal standards, and positive controls. While many proteomic reference standards and materials already exist, some will need to be developed and tailored to the specific assays performed and instruments employed. For crime laboratories that adopt forensic proteomic methods, criteria need to be established for evaluating newly developed proteomic reference standards and materials.
Keyword(s):	Proteomics, reference standards, materials, system suitability check standards, internal standards, positive controls

Submitting subcommittee(s): Forensic Proteomics Task Group **Date Approved:** 4/2/2026

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)

Drafting of relevant standards to address this gap are in progress.

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)?

The New York City Office of Chief Medical Examiner (NYC OCME) routinely uses validated standard samples of blood, saliva, and semen in body fluid assays and provides relevant procedural manuals online (Molecular Serology - OCME). In-house statistics are also routinely performed on a validated sample injection standard. Additionally, an NIJ grant was awarded for *Validation of a Confirmatory Proteomic Mass Spectrometry Body Fluid Assay for Use in Publicly Funded Forensic Laboratories* (Research and Evaluation for the Testing and Interpretation of Physical Evidence in Publicly Funded Forensic Laboratories Award #15PNIJ-21-GG-02712-SLFO) to evaluate labeled body fluid peptides and a digestion standard.

3. Key bibliographic references relating to this research need: (ex.: Toll, L., Standifer, K. M., Massotte, D., eds. (2019). Current Topics in Opioid Research. Lausanne: Frontiers Media SA. doi: 10.3389/978-2-88963-180-3)

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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, this research need is not identified by NIJ.

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

Current laboratory capabilities are limited by the knowledge and capabilities of the laboratory to develop their own reference standards and materials. Laboratories may also be limited to using reference standards and materials that already exist but that are not directly applicable to forensic science. If forensic proteomic reference standards and materials were developed, it would alleviate the burden of individual development on the part of each laboratory. This development would assist new laboratories in adopting forensic proteomic methods and would also serve as an equivalence metric between different laboratories, equipment, or methods.

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

This is an applied research need. Its successful completion would improve the application and speed the adoption of proteomic mass spectrometry for routine forensic testing.

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

This research will standardize assay methods and help to formalize uniform testing procedures, allowing different forensic laboratories to perform testing that is comparable across jurisdictions, and will likely aid in securing court approval in Frye and Daubert hearings.

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.