

OSAC RESEARCH NEEDS ASSESSMENT FORM



Title of research need:

Describe the need:

There is an existing body of research comparing DNA evidence collection techniques at the crime scene and/or in the laboratory, especially for low level samples like touched objects/bodies or worn clothing where optimization is critical for successful recovery (1). For swabbing methods researchers found differences based on the type of swab, the swabbing solution, and the swabbing motion (2). The release of biological sample from the collection material is as critical as the ability to collect from the surface (3). Depending on the substrate, other methods like scraping, vacuum suction, and tape lifting compare favorably to swabbing and may yield better DNA results (4, 5). If in the future, evidence is slated for parallel RNA/DNA extraction and testing, it should be noted that RNA is more susceptible to hydrolysis and success rates increase after dry collection (SA Harbison, personal communication). Evidence collection on touched objects also needs to consider the presence of cell free DNA (6). Overall, it is unclear how much of the DNA collection optimization research has been adopted in DNA laboratories and especially by crime scene collection teams. It would be helpful to have a decision matrix of recommended techniques for the different combinations of expected biological substances and substrates. DNA recovery must be optimized for each collection device. Much of the research could be based on the existing literature and supplemented by experimental research as needed. Research outcome should include specific collection recommendations and material to be used for implementation and training.

Keyword(s):

Submitting subcommittee(s): **Date Approved:**

(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)

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)?

3. Key bibliographic references relating to this research need:

- 1) Brownlow RJ, Dagnall KE, Ames CA (2012) A Comparison of DNA Collection and Retrieval from Two Swab Types (Cotton and Nylon Flocked Swab) when Processed Using Three QIAGEN Extraction Methods. *Journal of Forensic Sciences* 57:713-717.
- 2) Thomasma SM, Foran DR (2013) The Influence of Swabbing Solutions on DNA Recovery from Touch Samples. *Journal of Forensic Sciences* 58:465-469.
- 3) Adamowicz, M. S., Stasulli, D. M., Sobestanovich, E. M., & Bille, T. W. (2014). Evaluation of methods to improve the extraction and recovery of DNA from cotton swabs for forensic analysis. *PLoS ONE*, 9(12), 1–19.
- 4) Hansson O, Finnebraaten M, Knutsen Heitmann I, et al (2009) Trace DNA collection—Performance of minitape and three different swabs. *Forensic Science Int: Genetics Supplement Series*, 2:189-190
- 5) Verdon TJ, Mitchell RJ, van Oorschot RA (2014) Evaluation of tapelifting as a collection method for touch DNA *Forensic Science Int: Genetics*, 8:179–186
- 6) Quinones I, Daniel B (2012) Cell free DNA as a component of forensic evidence recovered from touched surfaces. *Forensic Science International: Genetics*, 6, 26-30.

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?

Somewhat, in the most recent 2019 release, *Improved DNA collection devices or methods for recovery and release of DNA*

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

Optimized evidence collection will increase DNA yields and thus improve not only DNA typing success rates but also the quality of the data obtained for traditionally low template samples. The latter will make profile interpretation less cumbersome and more reproducible.

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

The current research on collection techniques has been produced with a variety of methods and occasionally results contradict each other. A comprehensive review and additional experimental data either confirming conclusions or filling gaps in the current data sets are necessary prior to attempting to formulate best practices in this area.

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

Higher success rates on probative items of evidence will increase the number of cases where forensic DNA testing can inform the fact finder and support either the defense or the prosecution theory of a crime. Dissemination of recommendations on DNA evidence collection methods will help standardize practices across the US and ensure victims, victims' families and accused individuals will be served equally independent of geographic area.

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.