

OSAC RESEARCH NEEDS ASSESSMENT FORM



Title of research need:

Describe the need:

Trace DNA is characterized by low amounts of DNA and the absence of body fluid information. In most cases forensic scientists cannot determine how or when this DNA was deposited on an item of evidence, and several plausible activity scenarios may explain the findings. This interferes with a straightforward evaluation of the probative value of a trace DNA result. In order to appropriately inform investigators and other criminal justice stakeholders, scientists need to know more about the movement of DNA in the environment. Questions are: how much pre-existing DNA can be commonly found on objects, how long would DNA survive on hands or other items serving as a transfer vector, how often detectable DNA transfer can occur, and how are the odds of detecting trace DNA affected by collection and processing techniques. This combination of factors has also been described as DNA transfer, persistence, prevalence and recovery (DNA-TPPR).

While some authors have attempted to assess activity scenarios through simulated case studies, practitioners will encounter many different combinations of scenarios and variables, and a more general approach is needed. Research should address how data on DNA-TPPR should be collected to be applicable across different laboratories, and how data points can be combined to provide useful information in specific cases.

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) Fonnelop, A. E., Ramse, M., Egeland, T., & Gill, P. (2017). The implications of shedder status and background DNA on direct and secondary transfer in an attack scenario. *Forensic Sci Int: Genet*, 29, 48-60.

- 2) Goray, M., Mitchell, J. R., & van Oorschot, R. A. H. (2012). Evaluation of multiple transfer of DNA using mock case scenarios. *Legal Medicine*, 14(1), 40–46.
- 3) Goray, M., Mitchell, R. J., & Van Oorschot, R. A. H. (2010). Investigation of secondary DNA transfer of skin cells under controlled test conditions. *Legal Medicine*, 12, 117–120.
- 4) Lehmann, V. J., Mitchell, R. J., Ballantyne, K. N., & Oorschot, R. A. H. Van. (2015). Following the transfer of DNA : How does the presence of background DNA affect the transfer and detection of a target source of DNA ? *Forensic Sci Int: Genet.*, 19, 68–75.
- 5) Taylor, D., Abarno, D., Rowe, E., & Rask-Nielsen, L. (2016). Observations of DNA transfer within an operational Forensic Biology Laboratory. *Forensic Sci Int: Genet*, 23, 33–49.
- 6) Taylor, D., Biedermann, A., Samie, L., Pun, K.-M., Hicks, T., & Champod, C. (2017). Helping to distinguish primary from secondary transfer events for trace DNA. *Forensic Sci Int Genet*, 28, 155–177.
- 7) Van Oorschot, R.A.H., Szkuta, B., Ballnatyne, K.N., Goray, M. (2017) Need for dedicated training, competency assessment, authorizations and ongoing proficiency testing for those addressing DNA transfer issues. *Forensic Sci Int: Genet, Supplement Series 6*, e32-e34.
<https://doi.org/10.1016/j.fsigs.2017.09.013>

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 - Comprehensive, systematic, well-controlled studies that provide both foundational knowledge and practical data about "touch evidence" DNA transfer (e.g., primary, secondary) and persistence in the real world, as well as best practices for interpretation

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

DNA laboratories have well established procedures to process and report biological fluids like blood, semen and saliva. But the majority of casework submissions, in violent cases as well as non-violent volume crimes like burglaries, now consist of touched objects, also referred to as contact traces. Any DNA results associated with DNA from these items (trace DNA) are routinely challenged in court since it often cannot be determined, if the DNA was pre-existing, or if deposited during the commission of the crime from direct or indirect contact. Any method helping to distinguish between deposit scenarios would benefit laboratories during reporting and testimony and maximize the use of trace DNA results.

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

The evaluation of alternative casework scenarios like direct or indirect transfer in forensic DNA cases is currently based on subjective criteria such as the forensic scientist's casework experience. Data based on casework experience were generated on "unknown" samples, and as such are lacking in "ground truth". A more systematic, scientific approach for evaluating trace DNA results beyond the random match probability is needed.

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

DNA results associated with DNA from touched objects (trace DNA) are routinely challenged in court either because the DNA may have been pre-existing, or if it can be established that DNA was deposited during the commission of the crime, if that occurred through direct or indirect contact. Any method

helping to distinguish between deposit scenarios would ensure that probative results are properly recognized, and that non-probative DNA is not used to wrongfully convict an individual.

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.