OSAC RESEARCH NEEDS ASSESSMENT FORM

Title of research need: Empirical Research Studies Needed to Assess the Scientific Validity and Reliability of Bitemark Analysis

Describe the need:

The Subcommittee recognizes the critical need for additional research in the field of bitemark analysis. The analysis of pattern injuries of suspected dental origin, commonly known as bitemark analysis, has been shown by a recent foundational review to lack support for key premises of the field. This is a starting point for what is needed to potentially make bitemark analysis valid, repeatable, and reliable. The Subcommittee also acknowledges that as research progresses new areas of exploration may be revealed.

This is neither an exhaustive list, nor is this in any order.

1. Establishment of criteria that are expressed clearly and accompanied by empirical testing to demonstrate sufficient inter and intra-examiner reliability and validity when the criteria are applied. These criteria include:
    a. Research investigating whether scientific objective criteria exist for determining if and when a patterned injury originated from a dentition, represents a bitemark, and constitutes a human bitemark.
    b. Research investigating whether scientific objective criteria exist for distinguishing among a primary (child), mixed (adolescent), or permanent (adult) human bitemark.
    c. Research investigating whether scientific objective criteria exist for establishing the class characteristics suggestive of a human bitemark.
    d. Research as to whether the current terminology adequately convey the source conclusions in bitemark comparison.
    e. Research investigating whether there are sufficient scientifically objective criteria characteristics of a pattern that can be accurately excluded or not exclude individuals as the source of a bitemark.
    f. Research into the creation and development of statistical methods in bitemark analysis.
2. Research investigating variables (e.g. environmental factors, angles, and movements) that could influence the appearance of the pattern injury.
3. Research investigating alternative causes that could produce a pattern similar to a bitemark.
4. Research investigating the properties of the substrate including its ability to accurately reflect a pattern.
5. Research that could lead to the development and use of new technologies and methods in bitemark analysis that are validated and reliable.
6. Research into human factors that could affect analysts and developing reliable methods to limit the influence of those human factors.
7. The research shall include the error rate of the methods as well as the establishment of quality assurance methods to ensure proper implementation.

Keyword(s):	

Submitting subcommittee(s):	Odontology	Date Approved:	9/15/2025

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)

Yes

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)?

No

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)

Sauerwein K, Butler JM, Reczek KK, Reed C (2023) Bitemark Analysis: A NIST Scientific Foundation Review. (National Institute of Standards and Technology, Gaithersburg, MD), NIST Interagency Report (IR) NIST IR 8352, 2. https://doi.org/10.6028/NIST.IR.8352 (Last visited March 2024)

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-groupoperational#latest? Is your research need identified by NIJ?

In part, yes.

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

It would provide foundational studies in all aspects of bitemark analysis and could provide statistical foundation, which is currently absent.

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

It would provide foundational studies in all aspects of bitemark analysis. This could allow the development of standards in this discipline.

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

It could allow the use of reliable opinions based on validated and repeatable science.

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

	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.