

Bitemark evidence and analysis should be approached with caution, study reports

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Against the backdrop of last week's Congressional hearing into the future of forensic science, researchers from the University at Buffalo's Laboratory for Forensic Odontology Research in the School of Dental Medicine, have published a landmark paper on the controversial topic of bitemark analysis.

The Congressional hearing focused on the findings of a National Academy of Sciences (NAS) report on the scientific basis of forensic disciplines. Among the pattern evidence fields (fingerprints, tool marks, etc.) that were reviewed in the NAS report, bitemark analysis received critical commentary. During the hearing, Innocence Project co-founder Peter Neufeld introduced Roy Brown, wrongfully convicted on bitemark evidence and later exonerated through DNA analysis.

In anticipation of the NAS report, the new UB study published in the *Journal of Forensic Sciences* challenges the commonly held belief that every bitemark can be perpetrator identified.

"Bitemark identification is not as reliable as DNA identification," explains the study's lead author Raymond G. Miller, D.D.S., UB clinical associate professor of oral diagnostic sciences.

"With DNA, the probability of an individual not matching another can be calculated," he says. "In bitemark analysis, there have been few studies that looked at how many people's teeth could have made the bite."

Miller's co-authors include UB's Peter J. Bush; Robert Dorion, D.D.S., DABFO, UB adjunct professor of oral diagnostic sciences; and Mary A. Bush, D.D.S., UB assistant professor of restorative dentistry. Dorion is the editor of the only comprehensive textbook on the subject of bitemarks in forensic science, *Bitemark Evidence: A Color Atlas and Text*, and is currently the odontology section representative to the board of directors of the American Academy of Forensic Sciences.

The current study investigated three main questions: is it possible to determine biter identity among people with similarly aligned teeth; is it possible to determine how many individuals from a larger sample might also be considered as the biter; and, if there is bite pattern distortion, is it enough to rule out a specific biter while still including a non-biter?

To answer these questions, the researchers gathered 100 stone dental models (replicas of the dentition), which were measured and divided into 10 groups based upon the misalignment patterns of the teeth. After randomly selecting one model from each of the 10 groups, the researchers impressed bitemarks on cadaver skin. After the bitemarks were created, they were then photographed and the indentations were compared to the dentitions using overlays created with photographic software.

The authors are one of the first to use a human skin model rather than animal models or non-elastic biting substrate, such as wax or Styrofoam. Current human subject restrictions limit experimentation on living subjects.

"Living bitten tissue may bleed or bruise," explains Miller. "The initial bitemark indentations rebound shortly after infliction often leaving a diffuse bruising that may be difficult to measure accurately. The indentations produced in our study represented the best conditions for measurement."

The results indicated that when dental alignments were similar, it was difficult to distinguish which set of teeth made the bites. Distortion noted in the bitemarks allowed matches even from different alignment groups. Therefore, the researchers concluded that bitemarks should be very carefully evaluated in criminal investigations where perpetrator identity is the focus of a case.

As Miller notes, "In the past 10 years, the number of court cases involving bitemark evidence that have been overturned led us to question the reasons for the erroneous bitemark identification. It's important to recognize the serious consequences of a misidentification for the accused, the victim, the families involved, the justice system and the possibility that the perpetrator is still at large."

Source: University at Buffalo ([news](#) : [web](#))

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