## G20 Hazards with Bitemark Identifications

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After attending this presentation, attendees will understand how the position of bitemark photographs impacts the resultant reliability. Attendees will be able to identify how skin distortions impact the reliability of bitemark interpretation and will understand the limitations related to working with victims, given that dead men tell no lies and live victims are not reliable in describing exact body positions at the time of a bite.

This presentation will impact the forensic science community by explaining the need to limit the use of bitemark identifications in the judicial system.

In recent years, human bitemark interpretation has experienced a large degree of scrutiny due to the subjective aspects of the interpretation process. Analysis has never passed scientific examination.[1-3] Some critics contend the rate of error or of false identifications may be as high as 91%. High-profile cases in which people have been convicted largely on the basis of bitemark analysis and later proven innocent through DNA testing include Willie Jackson in Louisiana, Ray Krone in Arizona, Calvin Washington in Texas, James O'Donnell in New York, and Dan Young in Illinois.[4]

Attendees will be introduced to alternative measuring considerations when utilizing the standard American Board of Forensic Odontology (ABFO) #2 reference scale to evaluate bitemarks.

Devore and Harvey recognized that, while the human dentition may be unique, bitemarks made on malleable mediums, such as human skin, are not.[5,6] During a physical altercation, skin will stretch and distort as victims alter their body position while fighting for their release.[7] After an assault, bitemarks on living tissue can experience inflammation and hemorrhaging.[1,8]

Tattoos and external bite stamps have been utilized as substitutes for bitemarks by Lewis and Marroquin.[9] Each substituted mark has been photographed using an ABFO #2 reference scale with measurements taken at multiple locations. Changes in body position were photographed at each location. A representative maxillary arch width measurement of 40mm was used for comparison based on work by Rawson et. al. in which 397 dental arches were examined with the determination that maxillary arch widths range between 21.3mm and 41.0mm.[10] P. Magne, G.O. Gallucci, and U.C. Belser provided a related study examining maxillary anterior tooth widths and found central incisors had maximum widths measuring 9.10mm-9.24mm.[11]

In Devore's 1971 study and Lewis's and Marroquin's 2015 study, an inked stamp was placed on the surface of living human tissue as a representative bitemark to show positional distortions.[5,12]

A bruise by definition is a "contusion usually producing a hematoma without rupture of the skin".[13] Bitemarks produce hematomas that manifest with various degrees of organization and discoloration below the epidermis or outer skin layer. Tattoos similarly result in discolorations below the epidermis. Tattoos produce identifiable colored marks placed below the epithelial skin layer.

Distortions of 52.5% and 76.3% have been measured along the horizontal and vertical axes, respectively. Observed distortions were found to be non-uniform.[9]

**Reference(s):**


1. Bush M., Milelr R., Bush P., Dorion R. Biomechanical Factors in Human Dermal Bitemarks in a Cadaver Model. *J. Forensic Sci.* 2009 Jan; 54(1): 167-76.
2. Page M., Taylor J., Blenkin M. Expert Interpretation of Bitemark Injuries-A Contemporary Qualitative Study. *J. Forensic Sci.* 2013 May; 58(3): 664-72.
3. Committee on Identifying the Needs of the Forensic Sciences Community, National Research Council. *Strengthening Forensic Science in the United States: A Path Forward.* Washington DC: National Academies Press; 2009. 352p.
4. Innocenceproject.org (Internet). Cases Where DNA Revealed that Bite Mark Analysis Led to Wrongful Arrests and Convictions (cited 2014 Feb 6). Available from: http://www.innocenceproject.org.
5. DeVore D.T. Bite Marks for Identification? A Preliminary Report. *Med Sci Law.* 1971; 11(3): 144-5.
6. Harvey W., Millington P.F. Bite-marks – The Clinical Picture, Physical Features of Skin and Tongue, Standard and Scanning Electron Microscopy of Sections. *Int J Leg Med.* 1973; 8: 3-15.
7. Sheasby D.R., MacDonald D.G. A Forensic Classification of Distortion in Human Bite Marks. *Forensic Sci Int*. 2001; 122:75-78.
8. Sheets D.H., Bush P.J., Bush M.A. Bitemarks: Distortion and covariation of the maxillary and mandibular dentition as impressed in human skin. *Forensic Sci Int.* 2012 Sept; 223: 202-07.
9. Lewis C., Marroquin L. Tattoo Study of Skin Distortions. *Journal of Forensic Medicine and Legal Affairs.* July 2016.
10. Rawson R.D., Ommen R.K., Kinard G., Johnson J., Yfantis A. Statistical Evidence for the Individuality of the Human Dentition. *J. Forensic Sci.* 1984; 29 (1): 245-53.
11. Magne P., Gallucci G.O., Belser U.C. Anatomic crown width/length ratios of unworn and worn maxillary teeth in white subjects. *J Prosthet Dent.* 2003 May; 89(5):453-61.
12. Lewis C., Marroquin L.A. Effects of Skin Elasticity on Bite Mark Distortion. *Forensic Sci Int.* 2015; 257:293-296.
13. "Bruise." *Stedman's Medical Dictionary*. 22nd ed. 1973. Print.


**Bitemarks, Identification, Skin Distortions**