



### F11 A Study of Familial Bite Marks: Can We Discern Uniqueness?

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After attending this presentation, attendees will investigate whether familial dentitions that share common hereditary alignment patterns can be distinguished following production of bite marks in human cadaver skin. Attendees will appreciate how the distortion inherent in a bite mark on skin can diffuse differences that are apparent by metric analysis of the dentition itself.

This presentation will impact the forensic community by simulating a closed population of potential biters who have genetically related tooth alignment patterns.

Frequently the forensic odontologist is consulted to determine if pattern injuries on infants and young children can be attributed to a family member. Young children, specifically infants, are generally cared for by a small circle of relatives. The caregiver group is most often a closed (limited) population and may even include three generations from a single family. In such cases the forensic odontologist is directed to perform a complete analysis and documentation of the bite mark. After excluding the possibility of a self inflicted bite mark, a comparison must then be made against the dentitions of this closed group.

It is well known that physical characteristics are inherited from parent to child. Hair and eye color, stature and facial structure are obvious examples, but this also extends to dental alignment patterns. In situations in which there has been no orthodontic intervention, there may be similarities between the dentitions of parent and child that are recognizable and distinct from the general population.

In this study, impressions were collected from varied family groupings. Models were made of these impressions using dental stone. Hollow volume overlays were produced from the models using the Johansen and Bowers method. Metric analysis was performed on the overlays of each familial set of dentitions and similarities in metric dimensions and tooth angulations were noted. The models were then mounted on vise grips that served as a biting apparatus.

Human Subject Review Board (HSRB) exemption was applied for and granted for cadaver use in this project. The cadavers were obtained following rigor mortis, were stored at 4 degrees C, and were un-embalmed. The use of cadavers for such studies has been demonstrated to be the closest model to living human skin. Bite marks were then produced in cadaver skin using the familial models. As far as possible a similar anatomical location was used for the bite sequences. The bite marks were photographed immediately following the bite. The photographs were sized 1:1 with the overlays and comparison of the overlays to the bite mark was performed.

The first goal of this experiment was to determine if familial patterns could be recognized in the dentition. The second goal was to ascertain whether the similarities noted were sufficient to complete bite mark analysis once the bite pattern was recorded in skin.

Familial similarity in dental alignment is potentially an issue that the forensic odontologist should be concerned with in closed population incidents. This study seeks to gain an understanding of the impact of this issue in bite mark analysis.

#### **Bite Marks, Pattern Injuries, Heredity**