



F30 A Study of Bitemark Characteristics in Live Human Subjects

Kenneth P. Hermsen, DDS, Creighton University, School of Dentistry, 2500 California Plaza, Omaha, NE 68178; Eric S. Wilson, DDS*, PO Box 50, Cole Camp, MO 65325*

After attending this presentation, participants will understand the issues associated with performing bitemark research on live human subjects, including the Institutional Review Board process and the challenges encountered in doing research on live human subjects.

This presentation will impact the forensic science community by reporting on the latest attempt to move the study of bitemarks into the realm of research on live human subjects, providing insight into the issues encountered in the endeavor.

Thirty-two live human subjects volunteered for the project which was designed to compare the bitemarks that resulted from a bite. The bite was delivered by a device that was fitted with a set of denture teeth provided by the prosthetics laboratory at Creighton University School of Dentistry. The device was outfitted with a pressure sensor that could measure the amount of pressure being exerted by the bite. The intent of the project was to administer a bite with the same amount of pressure to each volunteer and compare the marks created. It was an attempt to determine if all the marks were similar in appearance or if there were significant variations that might be related to individual characteristics of the volunteers, like gender, stature, or muscle mass. During the IRB process, the project was altered to first determine the minimum amount of pressure that would be required to produce a mark in all the volunteers.

To accomplish this, fifteen volunteers from the original group of thirty-two were selected to participate. The forearm was selected for the site of the bite for this initial phase of the project. The volunteers were subjected to incremental increases in pressure until a mark was produced that lasted for a minimum of twenty-four hours. Based on the unexpected results of the initial phase, it became apparent that proceeding with the original research design would be extremely difficult and would bring into question some ethical issues that should be resolved before proceeding.

The results of the initial phase showed a significant variation in the amount of pressure required to produce a mark that lasted for twenty-four hours as well as significant variations in how the marks were manifest. The least amount of pressure to create a mark was in an Asian female who was the smallest in stature of the group. She exhibited a bruise at the site of the bite at a reading of 60 lbs. as indicated on the pressure sensor. It was not a pattern bruise but rather a round bruise approximately 10 mm in diameter in the area of the maxillary central incisors. The last two volunteers to mark were two males who did not exhibit a mark that lasted for twenty-four hours until the pressure sensor had indicated a pressure of 235 lbs. Neither of these marks were bruises, per se, but rather red marks corresponding to the incisal edges of the teeth. One of the males was the largest in stature of the group. The length of time the indentations made in the skin by the bite was also noted.

In all volunteers, the indentations left by the teeth had clinically disappeared within two hours of the administration of the bite with only one exception. In that exception, a female reported that the indentations were clinically detectable for approximately six hours. However, in spite of the persistence of the indentations, she did not exhibit bruising or marking of the bite for the required twenty-four hours. It should be noted that in previous and subsequent bites, her indentations disappeared within two hours. She reported having been working out prior to the application of the bite and suggested perhaps she was dehydrated. It is unknown whether this could be a factor. This study revealed a variation from 60 to 235 lbs in pressure required to produce a mark lasting twenty-four hours, it also showed a wide variation in the manifestations of the mark even though the volunteers were all young, healthy adults. Further study is required to draw any conclusions, but there are ethical issues that should be considered before moving ahead with further human studies.

Bitemark, Human, Live