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APPLICATION OF INCISE DENTAL SCANNER TO COMPARE BITE MARKS IN CHEESE WITH MODELS OF THE SUSPECTS' DENTITIONS

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Analysis of a bite mark offers an opportunity to identify a suspect using the individual characteristics of the dentition. The main focus normally is analysing bite marks on the human body. However, bite marks in food have an important role in the investigation of crimes. Bite marks can be analyzed with three dimensional technology, 2-D photographic image comparison of a bite mark and models of a suspects's dentition. This analysis is challenging. This study presents a comparison of bite-marks and the dentations' of the presumed subject using a technique of producing 3-D images of the indented marks and the dentations. It aimed to develop an objective, quantitative and reproducible 3-dimensional technique using a contact type of scanner, Incise Dental Scanner (IDS), to match and compare teeth, free form surfaces and bite marks. A sample of 6 dental study models and their corresponding bite marks made by the same participants into cheese blocks (20×40×20 mm) with their 6 upper anterior teeth. were digitized by the IDS at 0.1mm scanning interval and a scanning speed of 500 points per minute. The data was analysed using Cloud software (UCL, UK) to perform 3-D free-form superposition and the differences of mismatch from subtracted images. The biting edges are usually the only clear feature in a bite mark and therefore, were selected as the reference frame for the comparison using superposition of the 3-D images between the corresponding model and bite impression. The match of the outline of the bitten edges with their corresponding models was demonstrated in a 3-D subtracted colour image indexed by colour coded map. The descriptive statistical differences between the two corresponding images revealed a high degree of fit, with average differences ranging between -0.6 and 0.9 μm and square root of mean between 11.1 and 11.7 μm . It was demonstrated that IDS and the software "Cloud" gave quantitative matching between bite marks on hard substrates and suspect's teeth outline. This, with the 3-D presentation of the evidence can be presented with degrees of certainties, thus avoiding observer bias.

KEYWORDS: Forensic Odontology, Bitemark, Incise Dental Scanner