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PROBLEMS AND CHALLENGES IN BITEMARKS ANALYSIS: COMPARISON AND POTENTIAL OF THE CONCEPT OF "BIOMETRIC DENTAL ROSETTE"

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The problem of personal identification based on tooth bite marks is still an unsolved issue in the field of forensic medicine. Despite significant progress in technologies and analysis methods, the efficacy of dental identification still has some challenges. The development of empirical methods has contributed to substantial advancements in bite marks analysis. Current research suggests that the use of 3D scanning technologies and computer-aided methods generating promising results. Nevertheless, a major limitation of the current studies, is the relatively small sample size. However, it is fundamental and essential that such methods of analysis be based on strong research data supported by appropriate technical knowledge, to be at a high level of reliability, accuracy and repeatability, so that they can be allowed at court of law trials. The concept of a biometric dental rosette may offer a potential solution to the problems of current methods. The proposed new method uses both 3D models and advanced computer-aided engineering and reverse engineering systems, analyses of point surface and volume have led to the construction of curves and points representing characteristic dental features and their edges. The created biometric dental rosettes were individual and particularly unique, enabling positive identification of all subjects. In the presented work, the advantages and disadvantages of the currently used methods based on bite marks were described which were then compared with the potential of the tooth rosette biometric concept. Furthermore, the analysis included the used substrates for generating bitemarks, the registration technique and the software packages utilized for analysis. The parametrization of the rosette, description of a series of procedures, and examination with a larger sample may serve as a solution to most contemporary challenges in forensic medicine.