

Title: Applications of artificial intelligence in the utilisation of imaging modalities in dentistry: A systematic review and meta-analysis of in-vitro studies

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Abstract: Background: In the past, dentistry heavily relied on manual image analysis and diagnostic procedures, which could be time-consuming and prone to human error. The advent of artificial intelligence (AI) has brought transformative potential to the field, promising enhanced accuracy and efficiency in various dental imaging tasks. This systematic review and meta-analysis aimed to comprehensively evaluate the applications of AI in dental imaging modalities, focusing on in-vitro studies. Methods: A systematic literature search was conducted, in accordance with the PRISMA guidelines. The following databases were systematically searched: PubMed/MEDLINE, Embase, Web of Science, Scopus, IEEE Xplore, Cochrane Library, CINAHL (Cumulative Index to Nursing and Allied Health Literature), and Google Scholar. The meta-analysis employed fixed-effects models to assess AI accuracy, calculating odds ratios (OR) for true positive rate (TPR), true negative rate (TNR), positive predictive value (PPV), and negative predictive value (NPV) with 95 % confidence intervals (CI). Heterogeneity and overall effect tests were applied to ensure the reliability of the findings. Results: 9 studies were selected that encompassed various objectives, such as tooth segmentation and classification, caries detection, maxillofacial bone segmentation, and 3D surface model creation. AI techniques included convolutional neural networks (CNNs), deep learning algorithms, and AI-driven tools. Imaging parameters assessed in these studies were specific to the respective

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