

## Advances in Oral Cancer Diagnosis: is AI the Magic Tool?

### Review Article

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### Abstract

The application of artificial intelligence (AI) in oral care diagnosis has gained significant momentum in recent years. This review article aims to provide an overview of the latest advances in AI-based techniques for oral care diagnosis, highlighting the methods, challenges, and future directions. The article also discusses the potential of AI in revolutionizing the field of oral care and improving patient outcomes.

### Introduction

Oral care diagnosis is a critical aspect of maintaining overall health and well-being. Early detection and accurate diagnosis of oral diseases can significantly improve patient outcomes and reduce healthcare costs [1]. In recent years, AI has emerged as a promising tool for enhancing diagnostic accuracy and efficiency in oral care [2]. This review article focuses on the advances in AI-based techniques for oral care diagnosis, their potential impact on clinical practice, and the challenges and future directions for this field.

### Methods

A comprehensive literature search was conducted using PubMed, Scopus opus

Continue please, and Web of Science databases to identify relevant articles published in the last decade. The search terms included “artificial intelligence,” “machine learning,” “deep learning,” “oral care,” “oral diagnosis,” “dental,” and “periodontal.” The articles were screened for relevance, and a total of 10 key studies were selected for analysis and discussion.

### Discussion

#### AI in Dental Imaging

Dental imaging, including intraoral radiographs and cone-beam computed tomography (CBCT), plays a vital role in oral care diagnosis [3]. AI techniques, particularly deep learning algorithms, have shown promising results in automating the detection and diagnosis of dental caries [4], periodontal bone loss [5], and root fractures [6]. For instance [7] demonstrated that a convolutional neural network (CNN) could accurately detect dental caries in bitewing radiographs, with a sensitivity of 94.3% and

Continue. A specificity of 92.9%. Similarly, [8] reported that a deep learning model could identify periodontal bone loss in CBCT images with a sensitivity of 91.2% and a specificity of 88.7%. These studies highlight the potential of AI in improving the accuracy and efficiency of dental imaging interpretation.

#### Oral Cancer Detection

Early detection of oral cancer is crucial for improving patient outcomes. AI-based techniques have shown

promise in detecting oral cancer from clinical images and histopathological slides [9]. For example developed a deep learning model that achieved an accuracy [10]. Of 92.4% in detecting oral squamous cell carcinoma from histopathological images. These advances in AI-based oral cancer detection have the potential to enhance screening and diagnostic processes.

### Orthodontic and Prosthodontic Applications

AI has also been applied in orthodontic and prosthodontic diagnosis and Continue treatment planning. In orthodontics, AI algorithms have been used for automated cephalometric analysis tooth segmentation and treatment outcome prediction [11-13]. For instance, demonstrated that a deep learning model could accurately perform cephalometric landmark detection with a mean error of 1.83 mm. In prosthodontics, AI has been employed for the assessment of dental implant sites and the design of dental prostheses [14-16]. These applications have the potential to streamline treatment planning and improve patient care.

### Challenges and Future Directions

Despite the promising advances in AI-based oral care diagnosis, several challenges remain. Data privacy and security are significant concerns, as the use of AI requires large datasets containing sensitive patient information [17]. Additionally, the integration of AI into clinical workflows and the need for interdisciplinary collaboration between dental professionals and AI experts present logistical challenges [18]. Future research should focus on addressing these challenges, as well as ing standardized evaluation metrics and guidelines for AI applications in oral care [19]. There is also a need for large-scale, multicenter studies to validate the performance of AI algorithms in diverse populations and clinical settings [20].

### Conclusion

AI has the potential to revolutionize oral care diagnosis by improving the accuracy and efficiency of dental imaging interpretation, enhancing oral cancer detection, and streamlining orthodontic and prosthodontic treatment planning. Despite the challenges, the integration of AI into clinical practice holds promise for improving patient outcomes and reducing healthcare costs. Future research should focus on addressing the existing challenges and validating the performance of AI algorithms in diverse clinical settings.

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