

## Artificial Intelligence in Periodontology: Advantages and Challenges

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Dear Editor,

I am writing this letter to evaluate the position of artificial intelligence (AI) in Periodontology, which has become very popular in the diagnosis and management of periodontal diseases recently, and to comment on the advantages and challenges of using AI.

AI is a term for specially designed computer systems that mimic human intelligence and behavior [1]. Nowadays, subcategories of AI such as machine learning, deep learning, robotics, cognitive computing, and neural networks are used [2]. Some of them are used in the diagnosis of periodontal disease.

Periodontitis is a chronic inflammatory disease that progresses with damage to the periodontal attachment apparatus of the tooth and loss of alveolar bone [3]. If it is not treated, it can lead to tooth loss. Early diagnosis of periodontitis is extremely important. This point is very serious for the design an appropriate and detailed treatment plan and the positive progress of the disease prognosis. Clinical parameters (probing pocket deep, bleeding of probing and clinical attachment level) and radiological methods are used in the diagnosis of periodontitis [4]. Especially in the new classification, radiographic evidence of bone loss has an important role in determining the severity of periodontitis [3]. In this regard, studies using AI in the radiographic diagnosis of periodontitis have reported that AI gives promising results in periodontal diagnosis and is a valuable auxiliary diagnostic tool [5–7]. Additionally, AI has been shown to provide very helpful results in the assessment of periodontal bone loss [8]. Therefore, AI has a wide range of uses in diagnosis and disease classification, treatment planning, disease prognosis and risk assessment in Periodontology [9]. It can be useful in increasing the efficiency of data management and reducing the time spent on patient care. Maybe, in the near future, AI will be able to be used to create an individualized treatment plan for each patient suffering from periodontal disease, and in parallel, it will be able to reduce human-caused medical errors. Although AI applications in Periodontology have not yet shown their peak potential [10] they hold great promise for data collection, evaluation, treatment planning and management towards providing personalized treatment.



However, the challenges that AI should not be ignored. The most important of these difficulties is the need to verify the reliability of these innovative prediction techniques with further studies. Additionally, protocols, ethical concerns regarding patient trust, and potential technical issues such as the update needs for software have been reported among other challenges [11]. Another important issue is the possibility of security breaches in AI algorithms and data [12]. Additionally, for widespread use of AI, its integration into healthcare systems, training for clinicians, and the need to provide adequate funding may be other challenges to overcome [9].

Considering all these points, it can be said that AI cannot completely replace periodontists. The importance of clinical findings, especially in the diagnosis of disease in the periodontal area, reinforces this situation. However, it would be beneficial to integrate AI into regular training programs to increase both the development and motivation of periodontists [13]. The reported lack of awareness of AI in dentistry may confirm this need [14]. As a result, AI applications may serve as an auxiliary tool for maximizing the clinician's abilities and the 'clinical decision support systems' [15] in the future. It can be said that AI has a bright and revolutionary potential in healthcare for the future.

Yours Sincerely,

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