



## CHATGPT IN ORAL MEDICINE AND RADIOLOGY: AN EMERGENCE

## Dentistry

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## ABSTRACT

ChatGPT (Chat generative pre-trained transformer) is a cutting-edge Natural language processing (NLP) model developed by OpenAI, based on the GPT-3 architecture. It is one of the most advanced language models to date, capable of processing and generating coherent and contextually appropriate responses to natural language prompts. This makes it ideal for various applications, such as chatbots, language translation, and text completion. In oral medicine, ChatGPT can potentially improve diagnostic capabilities and serve as a platform for knowledge sharing and collaboration among oral medicinists. By using ChatGPT, specialists can improve discussions on complex cases and share research findings. Furthermore, it provides a space for exchanging expertise and best practices among specialists. This collective approach to knowledge sharing can contribute to the growth and development of the speciality of oral medicine. Additionally, ChatGPT can assist in the analysis of large volumes of unstructured clinical data. This review throws light on the usefulness of ChatGPT in the field of oral medicine and radiology without forgetting to mention its limitations.

## KEYWORDS

natural language processing, artificial intelligence, oral medicine, machine learning

## INTRODUCTION

In the 1950s, Alan Turing proposed the Turing test to evaluate a machine's ability to exhibit intelligent behaviour equivalent to that of a human.<sup>[1]</sup> In 1955, McCarthy J et al. suggested the term Artificial Intelligence (AI) during a two-month workshop.<sup>[2]</sup>

Artificial Intelligence (AI) has made significant strides in recent years, particularly in the field of machine learning. This technology encompasses sophisticated techniques such as deep learning, neural networks, natural language processing (NLP), computer vision, reinforcement learning, supervised and unsupervised learning, and transfer learning to achieve a level of intelligence that rivals that of humans. Machine learning is a branch of AI that involves training computer systems to learn from data and improve their performance on specific tasks.<sup>[2]</sup> Deep learning is a machine learning technique that utilizes neural networks with multiple layers to analyze complex data such as images and sounds. These neural networks are modelled after the human brain's structure and function, which enables them to learn and make decisions based on data patterns. Natural Language Processing (NLP) is an AI field that concentrates on empowering computers to comprehend, interpret, and create human language.<sup>[3]</sup> Computer vision allows computers to interpret visual data, such as images and videos. Reinforcement learning teaches an algorithm through trial-and-error interactions with an environment, receiving rewards for positive actions and punishments for negative actions.<sup>[2-3]</sup> Supervised learning is a machine learning technique where the algorithm is trained on labelled data, while unsupervised learning is trained on unlabelled data. Transfer learning involves using a pre-trained model as a starting point for training a new model on a related task.<sup>[2-3]</sup>

ChatGPT is a deep learning model used in natural language processing (NLP) that is based on the GPT (Generative Pre-trained Transformer) architecture.<sup>[4]</sup> It was developed by OpenAI IN 2018 to generate text that resembles human speech and engage in chat conversations with users.<sup>[5]</sup> Its modification ChatGPT-3 (OpenAI; San Francisco, CA), which is a large language model (LLM), was developed to leverage its use in November 2022, and is largely being studied to guide clinical decision-making, and as a guide to education.<sup>[6]</sup>

ChatGPT uses deep neural networks to learn language patterns from a vast amount of text data.<sup>[7]</sup> This feature allows the system to produce sensible and appropriate answers to given text inputs based on the context.<sup>[8]</sup> ChatGPT has been utilized extensively across industries such as healthcare, education, customer service, finance, and entertainment.<sup>[9]</sup>

## CHATGPT IN ORAL MEDICINE

Oral medicine and radiology is a crucial speciality in dentistry that focuses on diagnosing dental diseases, educating patients, and motivating them to maintain good oral health. ChatGPT plays a significant role in this field and serves as a valuable tool for oral medicine specialists. It has multiple applications and can be used in various ways to benefit patients.

## Knowledge:

ChatGPT offers oral medicine practitioners a convenient and swift way to access an extensive repository of medical knowledge. It encompasses cutting-edge research, clinical protocols, and therapeutic suggestions for various oral diseases. This wealth of information empowers oral medicine specialists to enhance their diagnostic proficiency, remain abreast of new developments, and make informed decisions in the course of their clinical work.

## Diagnosis And Treatment Planning:

Oral medicine practitioners can benefit from the assistance of this tool to make well-informed decisions.<sup>[10]</sup> ChatGPT can aid oral medicine practitioners in the diagnosis and treatment of patients. By analyzing various factors such as a patient's symptoms, medical history, and other relevant data, ChatGPT can provide personalized management strategies to help practitioners provide the best possible care. The use of ChatGPT could greatly enhance the efficiency and accuracy of oral medicine practices, leading to improved patient outcomes and higher levels of patient satisfaction.<sup>[11]</sup>

## Reports And Records:

ChatGPT is a valuable tool for oral medicinists, allowing them to generate thorough and precise reports for patient records,

consultations, and referrals. By providing pertinent clinical data, ChatGPT's text-generation function enables them to produce well-organized and detailed reports. This approach not only enhances documentation accuracy but also guarantees that critical information is captured efficiently.<sup>[10]</sup>

#### Telemedicine:

Enhancement of remote consultations and telemedicine services can be achieved through the integration of virtual interaction with oral medicinists. The oral medicinists can assist patients, address their queries, and deliberate on various treatment alternatives.<sup>[12]</sup>

#### Oral Potentially Malignant Disorders:

M. Diniz-Freitas et al recently conducted a study to evaluate how well ChatGPT performs in responding to questions regarding the diagnosis and management of Oral Potentially Malignant Diseases (OPMDs). The research team formulated a series of "primary questions" and input them into ChatGPT, which then provided information about various oral potentially malignant disorders. Interestingly, the study found that ChatGPT considered chronic hyperplastic candidiasis and exophytic verrucous hyperplasia/oral verrucous hyperplasia as OPMDs. The authors suggested that this may be due to a significant limitation in ChatGPT, which is its pace of updating, since the data used for its training may not be up-to-date.<sup>[13]</sup>

#### CHATGPT IN ORAL AND MAXILLOFACIAL RADIOLOGY:

##### Answering Questions To Aid In The Diagnosis:

ChatGPT can be given input in the form of the features describing a radiographic lesion and the potential diagnoses can be obtained in case of any radiograph that causes a dilemma for the clinician to arrive at a diagnosis. It should however not be relied upon completely but should only be used as an assisting aid.

#### Report Writing

While ChatGPT can provide reasonable responses to specific commands, it should not be relied upon for clinical use. Radiologists must be aware that ChatGPT is an AI-powered tool that cannot replace their expertise and responsibility in creating accurate and reliable reports. The radiology report generated by ChatGPT can be used as a draft to save time in a busy practice, but it must be significantly edited by the radiologist before being used as a medicolegal document or for clinical purposes. It's important to remember that the final report must reflect the expertise and experience and be the work of the radiologist.<sup>[14]</sup>

#### LIMITATIONS

ChatGPT should only be used in any field responsibly by keeping in mind all its limitations.

One of the significant limitations of using ChatGPT is the absence of accountability and potential bias in its responses. As an AI language model, ChatGPT acquires knowledge from extensive datasets that may incorporate societal biases. Such biases may unintentionally shape its suggestions, leading to unjust or discriminatory recommendations, particularly in medical situations. Therefore, it is imperative to consistently oversee and mitigate these biases to guarantee that ChatGPT's counsel aligns with ethical standards and fosters inclusivity in healthcare.<sup>[15,16,17]</sup> Another challenge is the potential for misinformation and inaccuracies in ChatGPT's responses. Despite its extensive training, ChatGPT may not always possess the most up-to-date medical knowledge or be aware of recent advancements in the field.<sup>[15]</sup> Cybersecurity has also been stated to be a potential threat.

While ChatGPT can help generate ideas and create content, there are concerns about its accuracy and authenticity in research and scientific writing. Some authors refer to this as an "AI-driven infodemic." However, it is important to note that ChatGPT cannot be considered an author. Similarly, there is debate about the role of ChatGPT in dental student education. While some see it as a useful aid for preparing presentations and essays, others worry about the potential negative impact on students' writing skills and creativity. Issues such as plagiarism, copyright infringement, and lack of authenticity also pose significant challenges in this area.

This technology's incapability to interpret images is a significant drawback in the field of radiology. To derive benefits from this tool, radiologists must describe the entity or pathology under review.<sup>[6]</sup> This technology does not state abbreviations clearly.<sup>[18]</sup>

#### CONCLUSION

ChatGPT is an emerging model from the umbrella of artificial intelligence. There are great positive possibilities for this tool in the field of oral medicine and radiology. Usage of this technology by oral health care providers will substantially help enhance diagnostic accuracy and treatment outcomes. However, it is only an aid and not a decision-maker itself. Keeping this and all its limitations in mind, and working towards a better collaborative setting is mandatory for a promising future. More research and further evolution of this technology are required to raise the heights of healthcare provision.

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