

## ChatGPT and scientific writing: A reflection on the ethical boundaries

Thaís Santos Cerqueira Ocampo<sup>1</sup>, Thaísa Pinheiro Silva<sup>1</sup>, Caio Alencar-Palha<sup>1</sup>,  
Francisco Haiter-Neto<sup>1</sup>, Matheus L. Oliveira<sup>1,\*</sup>

<sup>1</sup>Division of Oral Radiology, Department of Oral Diagnosis, Piracicaba Dental School, University of Campinas, Piracicaba, SP, Brazil

Dear Editors,

The new free tool launched in late 2022 known as ChatGPT (Chat Generative Pre-Trained Transformer), is an artificial intelligence (AI) language model that is trained on an extensive database and capable of generating texts on diverse subjects. By means of text messages, ChatGPT establishes a dialog with users to provide informational content and create texts within a wide array of styles.<sup>1</sup> Technically, ChatGPT could be used for scientific writing; however, it is important to reflect upon what makes a manuscript in fact scientific. Is it just a matter of style or, much more than that, is it all the scientific background supporting a clear research question, sound methodological design, irrefutable results, and an evidence-based conclusion?

Despite the constant repository feeding through machine learning, the startup OpenAI (San Francisco, CA, USA) responsible for creating ChatGPT has pointed out that even with this vast amount of information, some limitations may compromise its performance, such as the risk of providing incorrect information, producing harmful instructions, and inducing bias.<sup>2,3</sup> Furthermore, despite its ability to respond to several languages, better results are reported when searching in English.<sup>1</sup>

The possibility of humans being replaced with AI seems to be a major concern in the minds of contemporary professionals.<sup>4</sup> Although ChatGPT presents itself as a revolutionary tool capable of mimicking human writing, questions regarding its application in academic scenarios remain unclear.<sup>4</sup> It is important to highlight that the literature on the ethical aspects of using ChatGPT is still scarce; nonetheless, a recent study showed that students are already using it for scientific writing.<sup>1,4,5</sup> Therefore, there is an urgent need to dis-

cuss and understand the applications and possible developments of ChatGPT in the academic context. It is also necessary to reflect on its ethical limitations to include it more appropriately in daily educational life.

Although previous literature may not have specifically studied the application of ChatGPT to tasks associated with dental radiology, the emergence of ChatGPT has brought both excitement and caution. While it seems to have the potential to comprehensively collect, organize, and provide knowledge related to image-based diagnosis, we should not neglect professional judgment and critical thinking, especially when it comes to diagnostic accuracy. Concerns related to language inaccuracy, patient privacy, and data security should also be highlighted when using this tool to communicate sensitive medical information. Therefore, it is essential to have an ongoing and open discussion about the applications and advancements of this new AI language model in oral radiology. There is also a need for further research and development to ensure that ChatGPT can be integrated effectively into the workflows of oral radiologists and dentists.

Significant challenges related to the use of ChatGPT in higher education currently include the integrity of the provided data and discernment between ChatGPT-based writing and that carried out by humans.<sup>1,4</sup> Although the originality and reliability of the information in scientific research are or should be matters of common sense, students have been reported to frequently use ChatGPT to write abstracts.<sup>6,7</sup> The consequences of such a practice, which may be a cause of important concern, include the possible loss of the ability to search, analyze, and produce information critically, as expected from higher education students. However, despite some people's fear of being replaced by the technological advancement of ChatGPT, the ability to create knowledge based on the production of new information through scientific research seems to remain within the human domain, even though ChatGPT is able to carry out

Received April 13, 2023; Revised April 20, 2023; Accepted May 3, 2023  
Published online May 19, 2023

\*Correspondence to : Dr. Matheus L. Oliveira

Division of Oral Radiology, Department of Oral Diagnosis, Piracicaba Dental School,  
University of Campinas, 901, Limeira Ave, Piracicaba, SP, Brazil  
Tel) 55-19-2106-5327, E-mail) matheuso@unicamp.br

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Imaging Science in Dentistry · pISSN 2233-7822 eISSN 2233-7830

good data collection and generate texts unquestionably well.

It is crucial to highlight that while ChatGPT is still evolving, the likelihood of alternative and improved chatbots emerging is high. Therefore, an essential contribution of higher education institutions would be to propose ethical limits for using AI, to make good use of this technology without losing sight of the important role of humans in the production of knowledge. Because it is impossible not to recognize the value of such a tool, the importance of reflecting on ethical boundaries is strongly emphasized.

**Conflicts of Interest:** None

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