

Artificial Intelligence—AI—and *The Journal of Pediatric Pharmacology and Therapeutics*

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The hot topic of the day at the (real or virtual) water cooler, rounding on the wards, in the intensive care units, in the lay press, and most importantly for our *JPPT* readership, and the academic and scientific publishing communities, is artificial intelligence (AI)—the many and soon to be more numerous, AI platforms. Everyone's talking about AI and how it will affect everything we do, how it can and will impact the world we live in. The good, the bad, the ugly. The frenzy, the many concerns... has HAL from *2001: A Space Odyssey* arrived? Is the Terminator cyborg really coming, or is "it" already here... "it" did say, "I'll be back"!! Many questions exist about these technologies; the many platforms; their outputs including what roles they may have, positive and negative; and the affect AI will have in every segment of the publishing world. As experience is gained with the use of these technology platforms, many more detailed and directed questions will be raised, leading to a better understanding of their true roles in research, research integrity, and publication, all combined with their many ethical perturbations.

Large language models (LLMs) like ChatGPT (Generative Pre-trained Transformer) and others using natural language—processing (NLP) technology are consuming the conversation worldwide with emotions of bliss and excitement for the tremendous potential these tools can afford for the good of society combined with appropriate skepticism, even fear and terror as to their negative, immense destructive potential. ChatGPT was released to the public, open access, in November 2022 by its developer, OpenAI, to much fanfare, concern, and astonishment. However, it is important to note that AI has been with us for many years. Artificial intelligence is, and has been, integrated into multiple functions we already depend on daily, for example, our search engines, Siri, Alexa, biometrics, automated customer services, and much, much more. What *is* new *is* the state of their development, these tools' capacity, and the continuously evolving sophistication of their machine learning capabilities to create—in seconds—polished, believable, output. Much food for our collective thought.

ChatGPT is just one of many natural language "bots" that are continuously trained on large amounts of data extracted from multiple sources including the world-

wide web (e.g., published articles of all sorts, books, Wikipedia and using NLP to simulate human conversation, thus "allowing the user to chat with the machine intuitively.") Like a PubMed search, one introduces a few, specific key words or terms and within seconds, the tool constructs a readable, believable and if done correctly, comprehensive text, including complicated, sophisticated medical and scientific research analysis and writing. In this regard, these self-learning tools can help, or even direct, investigators to identify the research question, refine and focus the study hypothesis, design optimal study logistics, analyze the data, and even write the paper—from Introduction through Methods and Results, to completing a data-driven, compelling Discussion section with specific recommendations ready for peer review and ultimate publication in the peer-reviewed literature. Oh yea, these tools can easily and rapidly address those sometimes confusing, journal-specific Author Instructions, construct and populate data tables, and design figures that effectively display the Results, all in a manner of seconds. Wow—what is not to like! Well... let's stop and take a moment (or many) to think about all the large and small ramifications as there are many real issues, known and yet to be defined, that relate to research performance and resultant publication, including their many deficiencies, that is, plagiarism, inaccuracies, and fabricated output. To date, these technologies cannot totally remove the human interface for these functions but, what is next?

The expansion of chatbot and NLP technology is just one of many contemporary challenges confronting the entire publication continuum from educators, investigators, to authors, peer reviewers, journal editors, their publishers, and above all, the reader. Like all technologic tools, thoughtful, realistic, easy to use, appropriate guardrails are needed to foster their greatest benefits while trying to limit the serious negatives that inevitably link with such innovations. On May 5, 2023, the US Food and Drug Administration released its discussion paper and request for feedback for "Using Artificial Intelligence & Machine Learning in the Development of Drug & Biological Products."² On May 16, 2023, Sam Altman, OpenAI CEO, testified before a US Senate subcommittee addressing the positive,

nefarious, and destructive potential of ChatGPT and other AI models.³ Recently, Brad Smith, president of Microsoft Corp, opined on the acute need for corporate and government regulation of this technology.⁴ (Microsoft is an investor in ChatGPT). To complicate this landscape further, Meta, the parent company of Facebook, in February 2023, made its AI technology available “as open-access software—computer code that can be freely copied, modified, and reused—providing outsiders with everything they need to quickly build chatbots on their own.”⁵ This is just the beginning, and it is sobering. I strongly encourage everyone to remain up-to-date with the many available platforms and their capabilities, both positive and negative.

To gain a good understanding of the roles LLM bots have today, and the roles they can and will play in all segments of pharmacy, medicine, clinical pharmacology, and toxicology research and practice, with a focus on scientific publication, readers are directed to a few excellent editorials by authorities representing recognized publications.^{1,6–11} Moreover, numerous papers and online first publications address uses as well as raising many questions regarding AI use. Biswas¹² published a very enlightening, succinct commentary titled “ChatGPT and the Future of Medical Writing.” For the reader who wants an introduction to this topic, I recommend reading this brief, provocative commentary and searching the medical literature for more on this evolving topic.

Recognizing the importance of AI to academic and scientific writing and subsequent publication, and the inability, at present, to effectively detect “bot”-written papers*, *JPPT* is instituting the following guidelines for authors regarding AI use in a manuscript submitted for potential publication in *JPPT*:

- ChatGPT or any AI/LLM tool is not an author and cannot be listed as an author or co-author of a *JPPT* manuscript because such tools cannot meet our standards for authorship.
- The use of any AI/LLM tools in any aspect of manuscript content including, but not limited to, study protocol design, study implementation, data collection, and data analysis, must be clearly acknowledged and specifically outlined in the Methods section. This includes stating the exact tool names, version numbers, manufacturers, and roles used.
- The use of any AI/LLM tools in any other aspect of a submitted manuscript, including, but not limited to, assisting with the writing, actually writing sections, correcting grammar, editing language, or any other use, must be completely outlined in the Acknowledgment section of the manuscript including the exact tool names, version numbers, manufacturers, and roles.
- *JPPT* always has and continues to expect total transparency by authors in the Methods and Acknowledgment sections, that is, complete and

comprehensive descriptions of every aspect of their research, and from manuscript preparation to submission where appropriate.

- I remind all authors of manuscripts submitted for publication in *JPPT* of their responsibilities and accountability for the accuracy and integrity of their data and text.

AI/LLM tools are here, continuously evolving with newer, expanded capabilities with each new platform, and they are here to stay. We cannot ignore these tools; rather we need to embrace this technology and monitor, define, and determine their proper, optimal, and ethical uses. As these tools are continuously evolving, so too is our assessment of the roles for AI/LLM as well as what will be an acceptable amount of AI input into manuscripts published in *JPPT*. The above guidelines represent our initial recommendations, knowing these too will evolve. The *JPPT* editorial leadership will keep our readership informed of all modifications.

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*Bot detection software programs are available with evolving capabilities for detecting degrees of bot-written material. Important differences exist between these programs as to identification of and quantitating the amount of bot-generated content. It is anticipated that these limitations will resolve over time while their ability to address new bot-driven challenges will be a continuing struggle.

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