

The artificial intelligence (AI) revolution: How important for scientific work and its reliable sharing

Artificial intelligence (AI) is the overarching field that aims to create intelligent machines and systems that can perform tasks that would otherwise require human intelligence. This term was first used in 1956 by American computer scientist John McCarthy.¹ In 1950, the 'Turing test' was developed to assess whether a machine exhibits intelligent behaviour equivalent to, or indistinguishable from, that of a human. In essence, if a human judge cannot reliably distinguish between responses from a machine and a human in a blind interaction, the machine is considered to have passed the test.²

AI involves creating algorithms and systems that enable computers to learn, make decisions and perform tasks that typically require human intelligence, such as problem-solving, learning, natural language understanding and pattern recognition. AI systems can be rule-based (following a set of pre-defined instructions) or learning-based (adapt and learn from data).

Under the umbrella of AI, machine learning (ML) focuses on designing algorithms that enable computers to learn from and make predictions or decisions based on data, without explicit

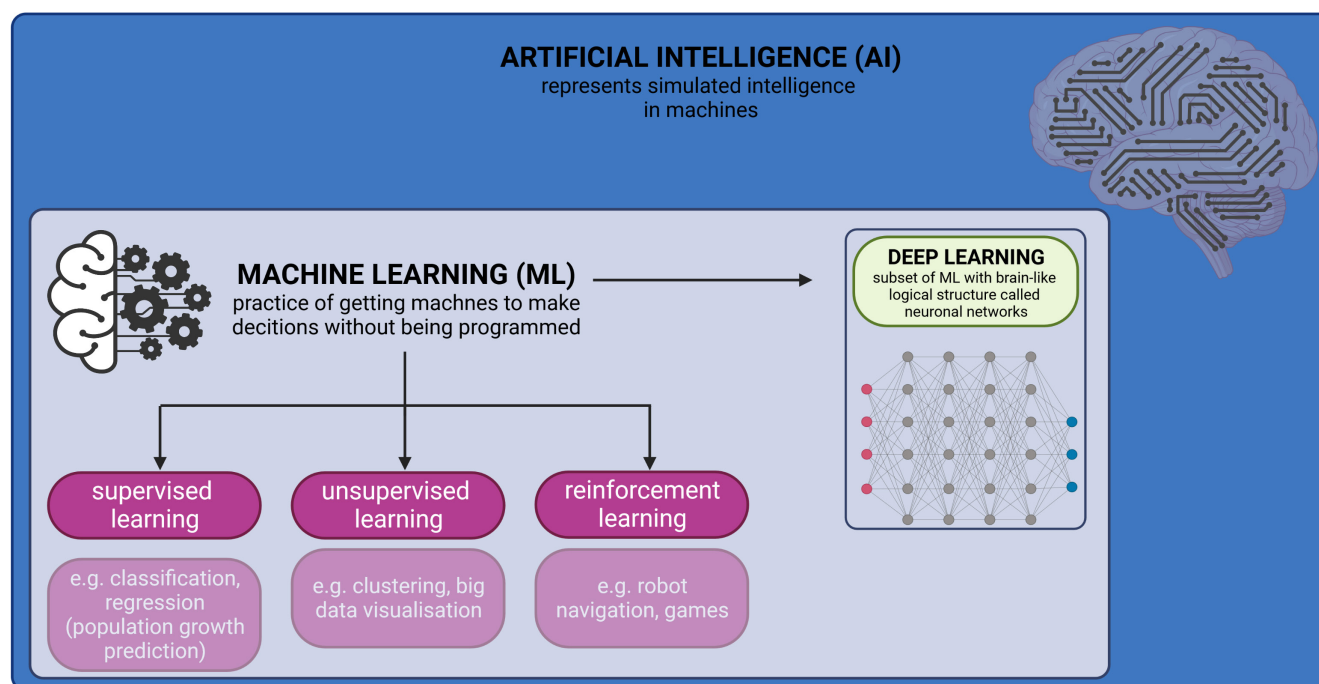


FIGURE 1 Structure of Artificial Intelligence (AI). (A) AI is a branch of computer science that aims to create systems capable of performing tasks that typically require human intelligence. (B) *Machine Learning* (ML) is a subset of AI that focuses on designing algorithms to learn from and make predictions or decisions based on data. In supervised learning algorithms, learn patterns or relationships between input features and output labels using a dataset of labelled examples to build a model that can generalise from the training data to make accurate predictions or decisions on new, unseen data. Unsupervised learning does not rely on labelled examples; it aims to discover hidden data structures, relationships, or patterns. Two of the most common unsupervised learning techniques are clustering and dimensionality reduction. Another type of ML is when an agent interacts with its environment and learns to make decisions through reinforcement learning. It is inspired by how animals learn through trial and error and is especially well-suited to sequential decision-making situations. The agent aims to maximise the cumulative reward it receives over time. (C) *Deep Learning*, a further subset of ML, uses artificial neural networks with multiple layers (hence 'deep') to model and understand complex patterns in datasets.

programming. These algorithms can identify patterns, generalise from examples and adapt over time. Deep Learning (DL) is a subfield of ML that deals with artificial neural networks. These networks are inspired by the structure and function of the human brain and consist of multiple layers of interconnected nodes (neurons). DL algorithms can automatically learn to represent data by training on large amounts of labelled data and are particularly effective at tasks such as image recognition, natural language processing and speech recognition (Figure 1).

AI plays a crucial role in modern healthcare. AI-powered tools can analyse patient data, including genetic information, environmental factors and medical records, to uncover potential allergy triggers and risk factors. This can facilitate early interventions and prevention strategies, improving patient outcomes. In research, AI is applied to investigate unsupervised vast amounts of data and has the potential to integrate. For example, AI can mine published literature, clinical trial data and patient records, identifying new insights into the mechanisms of allergic reactions and potential therapeutic targets.

Moreover, AI can be used to develop predictive models that forecast the prevalence and severity of allergies in specific populations, potentially enabling better resource allocation and public health planning. AI's ability to handle complex data and continuously learn from it accelerates the discovery of novel treatments and therapies,

ultimately enhancing the quality of care for allergy sufferers and contributing to the advancement of allergy research.³

Tens of new AI tools are being introduced to our lives every week. The rapid growth of AI tools is transforming how we live and work. As these tools evolve and improve, they will become even more influential in our daily lives. Despite the incredible progress made in the field, limitations to the assumptions of machine learning methods need to be considered. A good example is the representativeness of the sample and collinearity. A representative sample can generalise the results to the entire population. Collinearity means the linear correlation between independent variables. A strong relationship between the independent variables results in a cluster system that does not exist, and a lack of representativeness can reduce the results' reliability. One of the most common mistakes includes isolating several clusters without giving proper justification. The particular assumptions of machine learning methods should be an integral part of each research in which these methods are used.^{4,5}

With the increasing accessibility, AI may help the authors write medical articles by potentially enhancing the ability to analyse data, personalise content, detect errors and generate clear language and, in this way, speed up and control the process in a 'save-time' manner. This poses novel issues for scientific publications. However, ChatGPT,⁶ developed by OpenAI, one of the most popular tools, generates responses which might sound credible, but are incorrect

Model: Default (GPT-3.5)

MZ Cite 3 literature with DOI on the mechanisms of type I hypersensitivity reactions.

1. Gould, H. J., Sutton, B. J., & Beavil, A. J. (2003). The biology of IgE and the basis of allergic disease. *Annual Review of Immunology*, 21(1), 579-628. <https://doi.org/10.1146/annurev.immunol.21.120601.141103>
2. Galli, S. J., & Tsai, M. (2010). IgE and mast cells in allergic disease. *Nature Medicine*, 16(11), 1359-1365. <https://doi.org/10.1038/nm.2261>
3. Pawankar, R., Okuda, M., & Okumura, K. (2011). Mechanisms of IgE-mediated allergic responses. *Clinical and Experimental Allergy*, 41(1), 3-15. <https://doi.org/10.1111/j.1365-2222.2010.03664.x>

Regenerate response

Send a message.

ChatGPT may produce inaccurate information about people, places, or facts: [ChatGPT May 3 Version](#)

PubMed The Biology of IgE and the Basis of Allergic Disease

Search results

Review > *Annu Rev Immunol*. 2003;21:579-628. doi: 10.1146/annurev.immunol.21.120601.141103. Epub 2001 Dec 19.

The biology of IGE and the basis of allergic disease

Hannah J Gould¹, Brian J Sutton, Andrew J Beavil, Rebecca L Beavil, Natalie McCloskey, Heather A Coker, David Fear, Lyn Smurthwaite

Affiliations + expand

PMID: 12500981 DOI: 10.1146/annurev.immunol.21.120601.141103

PubMed

Found 1 result for an alternative search.

Your search for Galli, S. J., & Tsai, M. (2010): ... retrieved no results.

Review > *Nat Med*. 2012 May 4;18(5):693-704. doi: 10.1038/nm.2755.

IgE and mast cells in allergic disease

Stephen J Galli¹, Mindy Tsai

Affiliations + expand

PMID: 22561833 PMCID: PMC3597223 DOI: 10.1038/nm.2755

Free PMC article

PubMed

Found 1 result for *osphate, and the presence and degree of atopy in young children with asthma*

Review > *Clin Exp Allergy*. 2011 Mar;41(3):338-45. doi: 10.1111/j.1365-2222.2010.03664.x. Epub 2011 Jan 24.

Bronchial hyperresponsiveness to methacholine and adenosine 5'-monophosphate, and the presence and degree of atopy in young children with asthma

D I Suh¹, J K Lee, C K Kim, Y Y Koh

Affiliations + expand

PMID: 21255136 DOI: 10.1111/j.1365-2222.2010.03664.x

FIGURE 2 Sample ChatGPT query for three references “on the mechanism of type 1 hypersensitivity reaction”. Answer 1: the authors, journal, doi, year, volume and pages are correct. Answer 2: The title and authors are correct, but the doi, year, volume and page are incorrect. Answer 3: An article with that title and authors does not exist. The journal, year, volume and doi belong to another article.

or mistaken (Figure 2). Publishing such material without oversight from experts in the field who take responsibility for the accuracy of published articles can lower confidence in science with the potential to destabilise society.

ChatGPT is an advanced language model that generates human-like text by predicting the next word in a sequence based on the previous context. The model has been trained with various internet texts but cannot access the documents in its training set or any personal, confidential or proprietary data unless explicitly communicated in conversation. As a result, it generates answers by computing the statistical probability of a word in its previous context rather than having a contextual understanding of the world or text it produces. This explains why it can sometimes output plausible but incorrect or nonsensical answers (Data S1).

Regarding referencing, ChatGPT can provide inaccurate DOIs or citation information. This is because it does not access databases or the internet in real-time during the conversation to retrieve or check data. Instead, it generates text based on patterns learned during its training phase. Each citation it provides is a simulated output that mimics the citation style from the training data and does not reference a specific source. The lack of real-time data access and verification underscores the need for critical evaluation and fact-checking of AI-generated content, especially in scientific contexts.

Given the model's limitations, the importance of human oversight and critical evaluation when using AI tools such as ChatGPT cannot be overstated, especially in the scientific domain. Its use should be complemented by rigorous statistical analysis, a thorough understanding of underlying assumptions and limitations, and strict adherence to ethical guidelines to avoid misleading interpretations and maintain public trust in AI applications in HCPs. Ethical concerns regarding patient privacy, data security and informed consent can also arise. Ensuring AI's responsible and ethical use in medical research is crucial to prevent potential patient harm and maintain public trust.

1 | ALLERGY EDITORS' STATEMENT

By the publisher, Wiley & Sons, it has been clearly stated that to date, Artificial Intelligence Generated Content (AIGC) tools such as ChatGPT are not far enough evolved that they can be considered to provide originality to scientific work.⁷ Therefore, AIGC tools cannot qualify for authorship by fulfilling the generally accepted requirements, for example, given by the international committee of Medical Journal Editors (ICMJE).⁸ This also aligns with the Committee on Publication Ethics (COPE) position.⁹

The usage of AIGC must be clearly and transparently disclosed in the Methods and Acknowledgement section of scientific papers. The corresponding author is responsible for accurate reporting of AIGC usage, and all authors are responsible for the article's overall content. The journals' editors have full right to decide the impact of AIGC on the content finally and to accept or decline the respective article that has used AI tools.

AUTHOR CONTRIBUTION

All authors contributed to the writing and editing of the manuscript.

CONFLICT OF INTEREST STATEMENT

The authors declare that there are no conflicts of interest for this work.

Marek Jutel^{1,2} 

Magdalena Zemelka-Wiacek¹ 

Michał Ordak³ 

Oliver Pfaar⁴ 

Thomas Eiwegger^{5,6,7,8} 

Maximilian Rechenmacher⁵ 

Cezmi A. Akdis⁹ 

¹Department of Clinical Immunology, Wrocław Medical University, Wrocław, Poland

²ALL-MED Medical Research Institute, Wrocław, Poland

³Department of Pharmacotherapy and Pharmaceutical Care, Faculty of Pharmacy, Medical University of Warsaw, Warsaw, Poland

⁴Section of Rhinology and Allergy, Department of Otorhinolaryngology, Head and Neck Surgery, University Hospital Marburg, Philipps-Universität Marburg, Marburg, Germany

⁵Department of Pediatric and Adolescent Medicine, University Hospital St. Pölten, St. Pölten, Austria

⁶Translational Medicine Program, Research Institute, Hospital for Sick Children, Toronto, Ontario, Canada

⁷Department of Immunology, Temerty Faculty of Medicine, University of Toronto, Toronto, Ontario, Canada

⁸Karl Landsteiner University of Health Sciences, Krems an der Donau, Austria

⁹Swiss Institute of Allergy and Asthma Research (SIAF), University of Zurich, Davos, Switzerland

Correspondence

Marek Jutel and Magdalena Zemelka-Wiacek, Department of Clinical Immunology, Wrocław Medical University, ul. Chalubinskiego 5, 50-368 Wrocław, Poland.

Email: marek.jutel@all-med.wroclaw.pl and magdalena.zemelka-wiacek@umw.edu.pl

ORCID

Marek Jutel  <https://orcid.org/0000-0003-1555-9379>

Magdalena Zemelka-Wiacek  <https://orcid.org/0000-0001-7201-8638>

Michał Ordak  <https://orcid.org/0000-0001-5652-4397>

Oliver Pfaar  <https://orcid.org/0000-0003-4374-9639>

Thomas Eiwegger  <https://orcid.org/0000-0002-2914-7829>

Maximilian Rechenmacher  <https://orcid.org/0009-0002-0444-6483>

Cezmi A. Akdis  <https://orcid.org/0000-0001-8020-019X>

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SUPPORTING INFORMATION

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