

Introduction : “AI hallucinations are one of the biggest worries concerning the use of generative AI in science” (Doc.5), which illustrates the ambivalent impact of these technologies on research. This raises the question of the extent to which recent advances in AI are reshaping scientific research for better or for worse. The dossier at hand, composed of press articles, a scientific survey and an infographic , explores both the opportunities and the risks associated with AI. While it can accelerate discoveries and enhance research, it also raises major issues regarding reliability, ethics and the integrity of scientific knowledge.

TS 1 : AI is revolutionizing scientific research by accelerating processes, fostering creativity, and enabling unprecedented discoveries.

- Acceleration of research processes :
  - AI significantly speeds up data analysis and experimentation (Doc.3, chart p.3: “provides faster ways to process data”, “speeds up computations”).
  - What previously took years can now be done in hours or days (Doc.1).
- Generation of new hypotheses and creativity :
  - AI “hallucinations” can stimulate imagination and lead to unexpected ideas (Doc.1).
  - Scientists use AI to explore possibilities they would not have considered (Doc.1).
- Major scientific breakthroughs enabled by AI :
  - Example of protein design and Nobel Prize-winning research (Doc.1).
  - AlphaFold2 solving protein structure prediction (Doc.5).
- Improved accessibility and collaboration :
  - AI lowers barriers to entry and helps researchers access new fields (Doc.5).
  - Facilitates communication and writing for scientists (Doc.5).
- The infographic shows AI accelerating discovery cycles, improving predictions, and acting as a research partner.

Transition : However, despite these remarkable benefits, the growing reliance on AI also raises serious concerns about the reliability and integrity of scientific research.

TS 2 : Alongside its benefits, AI introduces major risks, particularly regarding accuracy, ethics, and scientific credibility.

- Unreliability and hallucinations :
  - AI produces false information and fabricated references (Doc.2, Doc.5).
  - “The tool cannot be trusted to get facts right” (Doc.2).
- Risk of misinformation and scientific fraud :
  - AI can generate fake papers and facilitate plagiarism (“AI slop problem”) (Doc.5).

- Makes fraud easier (Doc.3, negative impacts chart p.3).
- Threat to scientific rigor and reproducibility :
  - Ill-considered use leads to irreproducible research (Doc.3).
  - Overreliance on pattern recognition without understanding (Doc.3).
- Information overload and decline in quality :
  - Explosion of AI-generated publications risks drowning high-quality research (Doc.5).
  - Researchers may become dependent on AI summaries (Doc.5).
- Ethical and structural issues :
  - Biases in AI systems (Doc.3).
  - Power imbalances favoring well-funded institutions (Doc.3).
  - Confidentiality issues in peer review (Doc.5).

Transition : Given these opportunities and risks, the challenge now lies in finding ways to regulate and responsibly integrate AI into scientific practices.

TS 3 : To fully benefit from AI while limiting its dangers, scientists and institutions must develop responsible practices and regulatory frameworks.

- Need for human supervision and validation :
  - AI-generated results must always be tested and verified (Doc.1).
  - AI should assist, not replace, human expertise (Doc.2).
- Regulation and ethical guidelines :
  - Calls for regulations to control AI use in research (Doc.2).
  - European AI strategy aims to structure its development (Doc.5).
- Responsible use to enhance, not replace science :
  - AI can improve peer review and detect errors if used properly (Doc.5).
  - It should remain a tool supporting human reasoning.
- Maintaining scientific values :
  - Importance of preserving accuracy, transparency, and critical thinking.
  - Avoiding a shift toward “science by machines for machines” (Doc.5).

Conclusion : AI is transforming scientific research by accelerating discoveries while raising concerns about reliability and ethics. Ultimately, its impact depends on responsible use, ensuring it remains a tool serving scientists rather than replacing human judgment.

## **AI and science : a double-edged revolution**

“AI hallucinations are one of the biggest worries concerning the use of generative AI in science” (Doc.5), which illustrates the ambivalent impact of these technologies on research. This raises the question of the extent to which recent advances in AI are reshaping scientific research for better or for worse. The dossier at hand, composed of press articles, a scientific survey and an infographic , explores both the opportunities and the risks associated with AI. While it can accelerate discoveries and enhance research, it also raises major issues regarding reliability, ethics and the integrity of scientific knowledge.

First, AI appears as a powerful driver of scientific progress. It considerably accelerates research processes by enabling faster data analysis and computations, allowing scientists to obtain results in a fraction of the usual time (doc.3). Moreover, AI fosters creativity by generating new hypotheses and unexpected ideas, sometimes even through its so-called “hallucinations” (doc.1). This capacity has led to major breakthroughs, such as the development of AlphaFold2, which solved the long-standing problem of protein structure prediction (doc.5). In addition, AI tools facilitate access to knowledge and improve scientific communication, helping researchers write, summarize, and explore unfamiliar fields more efficiently (doc.5). Yet, these advantages also raise concerns about the reliability and limits of such technologies.

AI introduces major risks, particularly regarding accuracy, ethics, and scientific credibility. One key issue is the lack of accuracy of AI systems, which can produce false information or fabricated references, undermining scientific rigor (doc.2). This problem is reinforced by the emergence of fraudulent practices, such as AI-generated papers and plagiarism, contributing to what has been described as an “AI slop problem” (doc.5). Furthermore, the massive increase in publications, facilitated by AI, may overwhelm researchers and reduce the overall quality of scientific output (doc.5). Ethical concerns also arise, including biases in AI systems, inequalities between institutions, and confidentiality issues in peer review (doc.3; doc.5). Hence, these limitations call for a more controlled and responsible use of AI.

To fully benefit from AI while limiting its dangers, scientists and institutions must develop responsible practices and regulatory frameworks. Human supervision remains essential to verify and validate AI-generated results (doc.1). At the same time,

regulatory frameworks are being developed to guide the integration of AI into science and limit its misuse (doc.5). When used responsibly, AI can improve research practices, for instance by enhancing peer review or detecting errors, without replacing human judgment (doc.5). Maintaining a balance between innovation and control is thus crucial to preserve the integrity of scientific knowledge.

AI is transforming scientific research by accelerating discoveries while raising concerns about reliability and ethics. Ultimately, its impact depends on responsible use, ensuring it remains a tool serving scientists rather than replacing human judgment. As some fear, science could otherwise become “conducted by machines for machines” (doc.5).  
(470 words)