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Editorial

Role of artificial intelligence in genetics and gene therapy: An editorial overview

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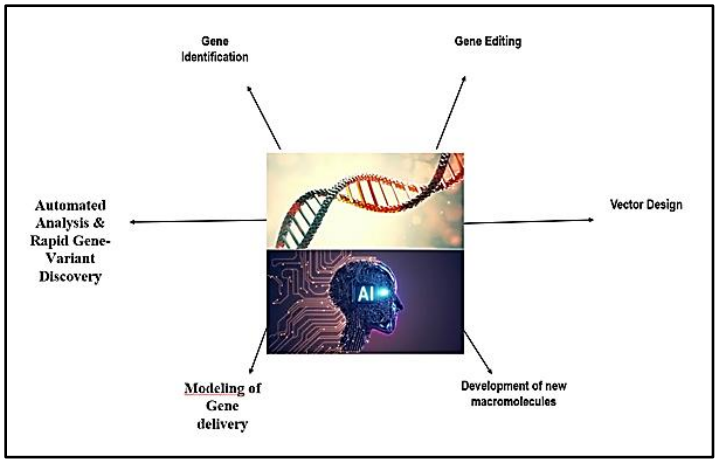
Abstract



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By evaluating enormous genomic datasets, detecting genetic problems, deciphering complex DNA, forecasting hereditary diseases, and improving gene-editing methods like CRISPR, artificial intelligence is revolutionising genetics. Next-generation sequencing (NGS) and other genomic technology advancements have produced enormous amounts of genetic data, making interpretation difficult. AI simplifies this procedure, enabling personalised medicine and increasing the precision and effectiveness of genetic condition diagnosis and treatment. With machine learning (ML) and deep learning (DL), artificial intelligence (AI) may identify intricate patterns that traditional methods are unable to pick up on. Nonetheless, there are still issues with guaranteeing data handling that is safe, moral, and compliance with regulations. AI has a profound impact on genetics in two important domains: genetic research and discovery and personalised medicine. It has the potential to revolutionise both genetic science and future healthcare.[1]

Studying cellular and animal models, evaluating enormous genomic datasets, and carrying out clinical trials—often over several decades—are all part of genetic research. It can be difficult to manage and validate large datasets across platforms, which leads to delays and inefficiencies. AI makes it possible to process, analyse, and share data quickly and securely, which transforms genetic research. Researchers, physicians, and patients can access real-time, well-structured

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genetic data through AI-powered systems, which speeds up discoveries and increases accuracy.[2]

The following explains how AI improves genetic research's efficiency, transparency, and teamwork:

1. Automated Analysis: AI-driven machine learning and deep learning effectively handle genetic data, minimising errors and cutting down on processing time.
2. Quick Gene-Variant Discovery: AI uses sophisticated pattern recognition to find genetic variants linked to disease.
3. Improved Gene Editing: AI increases the precision of CRISPR, allowing for safer and more efficient genetic alterations.

AI in genetic research improves productivity, teamwork, and the advancement of precision medicine. With a predictive, individualised, and data-driven approach, it is revolutionising healthcare. By improving diagnostics and personalised medicine and customising therapies based on a patient's unique genetic, environmental, and lifestyle characteristics, artificial intelligence is transforming healthcare. Targeted therapy, accurate medication selection, and early disease detection are made possible by the analysis of complicated biological data by machine learning (ML) and deep learning (DL). AI improves tumour profiling, forecasts the likelihood of hereditary diseases, and optimises pharmacogenomics for safer therapies. Early illness prevention, better medication selection, and real-time therapy modifications are some of the main advantages. AI is driving the future of precision medicine, revolutionising genetic research, and speeding up drug development.[2]

The number of experimental procedures and their repetition can be decreased using AI and CB. In order to prevent undesirable immune reactions after gene therapy treatment, these tools can introduce new target genes, fresh vectors, optimise experimental conditions, forecast results, and recommend the best courses of action. Artificial intelligence is one of the hottest topics in practically every branch of science and technology. Gene therapy can benefit from computational biology and artificial intelligence in a variety of ways, such as gene editing, vector design, gene identification, the creation of novel macromolecules, and gene delivery modelling. In this subject, computational biology and artificial intelligence employ a variety of technologies, including molecular interaction research, machine learning algorithms, transcriptome and proteomics data processing, and genomics. These tools can advise the best ways to prevent unwanted immune reactions after gene therapy treatment, anticipate the results, optimise experiment conditions, and introduce new gene targets and vectors. AI-based models and algorithms for creating tailored gene delivery vehicles that can use viral imitation techniques to get beyond intracellular and extracellular barriers.[3]

Conflict of Interest

None.

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