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Global AI in Precision Medicine Market - 2025-2033

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Abstracts

Global AI in Precision Medicine Market – Industry Trends & Outlook

The global AI in precision medicine market reached US$ 1,703.19 Million in 2024 and is expected to reach US$ 6,587.30 Million by 2033, growing at a CAGR of 38.7 % during the forecast period of 2025-2033.

AI in precision medicine involves leveraging artificial intelligence algorithms to process and interpret large volumes of patient data, such as genetic, environmental, and clinical information, to tailor medical treatments and diagnoses to each individual.

Key drivers fueling this market include the rising demand for tailored therapies, the growing prevalence of chronic and life-threatening diseases, and rapid advancements in genomics and multi-omics technologies. The integration of AI enables the processing of complex biomedical data for more accurate diagnostics, biomarker identification, and personalized treatment planning.

Opportunities in the AI in precision medicine market are expanding as more companies embrace collaborations, partnerships, and the integration of real-world evidence (RWE) to streamline drug discovery, clinical trial design, and patient stratification.

Industry trends indicate a shift toward AI-powered tools for early disease detection, personalized drug development, and real-time disease management through wearables and remote monitoring. Major players are investing in AI platforms that can analyze multi-modal data, while regulatory and data privacy challenges remain areas of focus as the market matures.

Global AI in Precision Medicine Market Dynamics: Drivers & Restraints

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Advancements in AI Technologies

Advancements in AI technologies are a major driver in the global AI in precision medicine market, fundamentally transforming how patient data is analyzed and used for personalized healthcare. Modern AI, including deep learning and machine learning, can process and interpret vast, complex datasets from genomics, proteomics, medical imaging, and electronic health records with unprecedented speed and accuracy.

These technologies enable the rapid identification of biomarkers, prediction of disease risk, and development of tailored treatment strategies, moving beyond traditional one-size-fits-all approaches. Innovations such as generative AI, digital pathology, and continuous learning systems are streamlining clinical workflows, automating diagnostics, and accelerating drug discovery.

AI-powered platforms can deliver biomarker results in minutes, assist in early cancer detection by analyzing medical images, and predict protein structures critical for drug development. These advancements not only improve diagnostic precision and treatment outcomes but also reduce costs and increase efficiency across healthcare systems.

For instance, in March 2025, Google is launching TxGemma, a collection of open AI models specifically designed to accelerate drug discovery and therapeutic development. Built on Google DeepMind’s Gemma architecture, TxGemma is trained to understand both natural language and the complex structures of therapeutic entities such as small molecules, chemicals, and proteins.

Also, in January 2024, Siemens Healthineers and the Indian Institute of Science (IISc) launched a collaborative laboratory in Bengaluru dedicated to using artificial intelligence (AI) for precision medicine in neurology research. This state-of-the-art lab will focus on developing open-source AI tools that automate the precise segmentation of pathological findings in neuroimaging data-essentially using AI to identify and analyze abnormalities in brain scans. All these factors demand global AI in the precision medicine market.

Data Privacy and Security Concerns

Data privacy and security concerns present significant restraints in the global AI in precision medicine market. As AI algorithms require large volumes of patient data to function effectively, there is growing anxiety about who controls and accesses this sensitive information, especially in the absence of harmonized regulations.

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Risks include the potential for re-identification of anonymized data, unauthorized data sharing, and breaches of confidentiality, all of which threaten patient trust and could expose intimate health details. Despite efforts to de-identify datasets, advanced AI techniques have demonstrated the ability to re-link data to individuals, amplifying concerns about data misuse and the adequacy of existing safeguards.

The regulatory landscape is evolving but remains fragmented, with new state and national laws emerging to address gaps left by frameworks like HIPAA. However, enforcement has often lagged behind technological advances, and past incidents of data misuse by major companies highlight the need for stronger oversight.

To mitigate these risks, organizations must adopt robust privacy-preserving techniques, implement strict data governance, and ensure compliance with emerging privacy laws. Without these measures, the risk of data breaches, loss of anonymity, and erosion of public trust could significantly hinder the adoption and growth of AI in precision medicine. Thus, the above factors could be limiting the global AI in the precision medicine market's potential growth.

Global AI in Precision Medicine Market - Segment Analysis

The global AI in precision medicine market is segmented based on technology, component, application, and region.

Component:

The software segment was valued at US$ 638.53 million in 2024 and is estimated to reach US$ 1,366.36 million by 2033, growing at a CAGR of 32-35% during the forecast period from 2025-2033

This segment includes AI algorithms and models, data analytics platforms, genomic analysis software, and clinical decision support systems that enable the processing, integration, and interpretation of vast and complex healthcare data for personalized medicine applications.

Software solutions are essential for analyzing genetic, clinical, and lifestyle data, supporting tasks such as predictive modeling, biomarker discovery, disease diagnosis, and personalized treatment planning. The rapid adoption of AI-based software platforms by healthcare providers and pharmaceutical companies is driven by the need for improved diagnostic accuracy, optimized treatment regimens, and accelerated drug

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discovery.

Continuous advancements in machine learning, deep learning, and natural language processing are further enhancing the capabilities and effectiveness of these software tools, solidifying the segment's dominance and fueling significant growth in the AI-driven precision medicine landscape.

For instance, in May 2024, OM1 launched three new products- OM1 Orion, OM1 Lyra, and OM1 Polaris- powered by its PhenOM artificial intelligence platform, which specializes in digital phenotyping for personalized medicine and clinical research. PhenOM leverages OM1’s vast, high-quality data cloud, containing billions of data points from over 340 million patients, to generate detailed digital phenotypes- unique, data-driven profiles of patient characteristics and disease patterns. These factors have solidified the segment's position in the global AI in precision medicine market.

Global AI in Precision Medicine Market – Geographical Analysis

The North America AI in precision medicine market was valued at US$ 730.02 million in 2024 and is estimated to reach US$ 1,574.60 million by 2033, growing at a CAGR of 36-38% during the forecast period from 2025-2033

This regional dominance is fueled by several interrelated drivers. There is a strong demand for personalized medicine, as the region faces a high and rising prevalence of chronic and life-threatening diseases, including cancer, cardiovascular, and respiratory conditions. This has prompted healthcare systems, pharmaceutical companies, and technology providers to invest heavily in AI-driven solutions that can tailor treatments and improve patient outcomes.

Another key driver is North America’s robust research and development infrastructure, supported by significant public and private funding. The presence of leading technology firms and healthcare innovators, such as Google Health and Tempus, fosters a climate of rapid technological adoption and collaboration. These companies are advancing AI applications in genomics, diagnostics, and drug discovery, often through strategic partnerships and joint ventures with hospitals, research institutes, and other industry players.

Additionally, the region benefits from a supportive regulatory environment, with agencies like the U.S. FDA guiding AI/ML applications in medicine. The widespread use of electronic health records (EHRs) and real-world evidence (RWE) platforms also

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provides the rich, structured data necessary for developing and validating AI models. This data ecosystem, combined with a diverse patient population, enables more accurate and generalizable AI-driven precision medicine solutions.

North America's leadership in the AI in precision medicine market is underpinned by its high healthcare expenditures, advanced digital health infrastructure, and a collaborative approach among technology, healthcare, and academic sectors. These factors collectively drive innovation, accelerate the adoption of AI-powered personalized medicine, and set the pace for global market growth.

For instance, in the US, in April 2025, Precision for Medicine and PathAI announced a strategic collaboration to advance AI-powered clinical trial services and biospecimen products. This partnership will integrate PathAI's advanced digital pathology technologies-including the AISight image management system and AI-driven algorithms-into Precision for Medicine's clinical trial and biospecimen operations.

The goal is to deliver novel analytical tools and services that address emerging needs in biomarker discovery, spatial biology, and tissue-based research. Thus, the above factors are consolidating the region's position as a dominant force in the global AI in precision medicine market.

The Asia-Pacific AI in precision medicine market was valued at US$ 360.95 million in 2024 and is estimated to reach US$ 803.11 million by 2033, growing at a CAGR of 40-42% during the forecast period from 2025-2033

The Asia-Pacific (APAC) region is emerging as one of the fastest-growing markets for AI in precision medicine, driven by increasing healthcare needs, digital transformation, and rising investments in biomedical research. Countries such as China, Japan, South Korea, India, Singapore, and Australia are leading the regional adoption, each contributing unique strengths, ranging from AI innovation and genomic research to large-scale healthcare digitization.

Japan is rapidly advancing next-generation drug design, healthcare robotics, and digital health platforms by integrating sovereign AI capabilities across its pharmaceutical, medical technology, and academic sectors. For instance, in June 2024, SoftBank Group Corp. and Tempus AI, Inc. formed a joint venture, SB TEMPUS Corp., to deliver precision medicine services in Japan by leveraging advanced artificial intelligence and Tempus' expertise in healthcare data analytics.

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For instance, in April 2024, iCarbonX is a leading Chinese healthcare company specializing in AI-driven precision medicine by integrating and analyzing diverse datasets, such as genomics, clinical records, lifestyle, and environmental factors. Founded by genomics pioneer Jun Wang, the company uses advanced artificial intelligence and machine learning algorithms to process multi-omics data-including genetic, metabolic, microbiome, and behavioral information-to generate highly personalized health profiles and actionable insights. Thus, the above factors are consolidating the region's position as a dominant force in the global AI in precision medicine market.

Global AI in Precision Medicine Market – Competitive Landscape (Major Players)

The major global players in the AI in precision medicine market include IBM Corporation, Microsoft Corporation, AstraZeneca, Sanofi, GE Healthcare, Intel Corporation, NVIDIA Corporation, Alphabet Inc., BioXcel Therapeutics Inc., Enlitic Inc., Google Inc., and Illumina Inc., among others.

Global AI in Precision Medicine Market – Competitive Landscape (Emerging Players)

The emerging players in the AI in precision medicine market include Exscientia, Insilico Medicine, TEMPUS, BenevolentAI, PathAI, Inc., and Guardant Health, Inc., among others.

Global AI in Precision Medicine Market – Key Developments

In April 2025, Illumina Inc. and Tempus AI, Inc. announced a strategic collaboration aimed at advancing the clinical adoption of next-generation sequencing (NGS) technologies. This partnership will leverage Illumina’s cutting-edge AI capabilities alongside Tempus’s robust multimodal data platform to develop and train genomic algorithms.

In January 2025, Guardant Health and ConcertAI announced a collaboration to provide biopharmaceutical companies with the industry’s first multi-modal real-world data (RWD) solution that combines comprehensive patient electronic medical record (EMR) data with both genomic and epigenomic tumor profiling across all stages of cancer care.

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