

Global Generative AI in Life Sciences Market Size Study and Forecast by Component (Software/Platforms, Services), By Deployment (Cloud-Based, On-Premise, Hybrid), By Technology (Large Language Models (LLMs), Natural Language Processing (NLP), Generative Molecular/Protein Models, Machine Learning & Deep Learning), By Product Type (Standalone, Integrated), By Application, By End User, and Regional Forecasts 2026–2036

<https://marketpublishers.com/r/GC296C19F1D9EN.html>

Date: August 2026

Pages: 285

Price: US\$ 3,750.00 (Single User License)

ID: GC296C19F1D9EN

Abstracts

The Global Generative AI in Life Sciences Market, valued at USD 1.19 Billion in 2025, is projected to reach USD 35.67 Billion by 2036, expanding at a CAGR of 35.4% during the forecast period. The market consists of artificial intelligence solutions that leverage generative models to expedite research, development, clinical operations, regulatory, and commercial activities in the life sciences industry. These solutions enable organizations to create new molecular frameworks, enhance protein design, automate the generation of scientific content, optimize the planning of clinical trials, improve regulatory documentation, and support data-driven decision-making. The market includes Software/Platforms and Services delivered through Cloud-Based, On-Premise and Hybrid. Core technologies: Large Language Models (LLMs), Natural Language Processing (NLP), Generative Molecular/Protein Models, Machine Learning & Deep Learning, and other AI tools as Standalone or Integrated solutions. Applications include Drug Discovery & Design, Clinical Trial Design & Operations, Regulatory Writing & Submissions, Medical Affairs & Scientific Content, Pharmacovigilance, Commercial & Market Access Content, and other life sciences workflows, for Pharmaceutical & Biotechnology Companies, CROs, Academic & Research Institutes,

MedTech/Diagnostics Companies and other end users.

The market is experiencing significant growth due to increasing demand for faster drug discovery, rising adoption of AI-based research platforms, growing complexity of clinical trials, and increasing digital transformation initiatives across pharmaceutical and biotech organizations. More companies are also deploying generative AI to identify new drug candidates, optimize biomolecular design, automate regulatory documentation, write scientific literature, enhance pharmacovigilance, and increase clinical trial efficiency, while reducing development costs and timelines. But it's technological advances in foundation models, multimodal AI, protein language models, retrieval-augmented generation (RAG), AI copilots and domain-specific large language models that are making a substantial difference in research productivity and scientific accuracy. In addition, the rise in investments in precision medicine, genomics, digital therapeutics, cloud computing, and AI-driven laboratory automation is further boosting the market adoption. Besides, the increasing collaborations among pharmaceutical companies, artificial intelligence technology providers, research institutions, and cloud platform vendors are expected to support the long-term growth of the global generative AI in life sciences market during the forecast period.

Global Generative AI in Life Sciences Market: Key Highlights

The Global Generative AI in Life Sciences Market was valued at USD 1.19 Billion in 2025 and is projected to grow at a CAGR of 34.4% during the forecast period (2025-2030) owing to the increasing adoption of AI-powered drug discovery, growing digital transformation across pharmaceutical research, rising demand for clinical trial optimization, and expanding use of generative AI in scientific and regulatory workflows.

The market is projected to reach USD 35.67 billion in 2036, growing at a CAGR of 35.4% between 2026 and 2036. Growth is driven by fast moving advances in foundation models, large language models (LLMs), protein design AI, cloud computing, precision medicine and growing investment in AI-powered life sciences innovation.

In 2025, North America held the highest share of the global market at 46.8%. The region has a mature pharmaceutical ecosystem, deep AI investments, strong biotech innovation, world class healthcare infrastructure and a host of leading artificial intelligence providers and life sciences companies.

The Asia Pacific region is expected to grow at the highest CAGR of 38.2% during 2026-2036, owing to rising pharmaceutical R&D expenditure, booming biotechnology industry, government initiatives to promote AI innovation, increasing clinical research activities, and rapid digital transformation of the healthcare and life sciences industries.

By component, Software/Platforms is expected to lead the segment with a market share of 68.5% in 2025. Leadership in the segment is driven by broad acceptance of AI platforms for molecular design, clinical analytics, scientific content generation, regulatory automation and enterprise AI integration.

Based on services, the services segment is projected to grow at the highest CAGR of 37.1% during the forecast period due to the increasing demand for AI implementation, consulting, model customization, validation, regulatory compliance, and managed AI services.

Cloud Based dominated the deployment segment with estimated share of around 61.4% in 2025 owing to scalability, flexible computing resources, collaborative research environment and rapid deployment of AI workloads across global organizations.

The hybrid deployment is expected to grow at the highest CAGR of 36.3% during 2026-2036 and is driven by increasing need for secure data management, regulatory compliance, protecting sensitive research, and flexible AI infrastructure with cloud and on-premise environment.

Drug Discovery & Design dominates the application segment, expected to hold a 34.9% share by 2025, driven by increasing use of generative AI for identifying new therapeutic candidates, enhancing molecular frameworks, forecasting protein interactions, and expediting early-stage drug development processes.

Additionally, greater investments in AI foundation models, digital laboratories, multimodal AI, protein engineering, precision medicine, clinical trial intelligence and regulatory automation will create major long-term opportunities for pharmaceutical companies, biotech companies, CROs, artificial intelligence (AI) technology providers and cloud platform providers.

Research Scope & Methodology

This study provides a comprehensive strategic assessment of the Global Generative AI in Life Sciences Market across the forecast period of 2026–2036. The report evaluates market size, revenue forecasts, competitive dynamics, technological innovations, regulatory developments, and emerging investment opportunities shaping the adoption of generative artificial intelligence across the life sciences industry. The assessment covers the complete value chain, including AI model development, software platforms, cloud infrastructure, data integration, deployment, validation, and end-user adoption across pharmaceutical research, clinical development, regulatory operations, and commercial functions. The study provides market analysis for the following segments: Component (Software/Platforms, Services); Deployment (Cloud-Based, On-Premise, Hybrid); Technology (Large Language Models (LLMs), Natural Language Processing (NLP), Generative Molecular/Protein Models, Machine Learning & Deep Learning, Others); Product Type (Standalone, Integrated); Application (Drug Discovery & Design, Clinical Trial Design & Operations, Regulatory Writing & Submissions, Medical Affairs & Scientific Content, Pharmacovigilance, Commercial & Market Access Content, Others); End User (Pharmaceutical & Biotechnology Companies, CROs, Academic & Research Institutes, MedTech/Diagnostics Companies, Others). The regional analysis includes North America, Europe, Asia Pacific, and LAMEA. The report examines the impact of pharmaceutical R&D investments, AI adoption, regulations, cloud infrastructure, biotechnology innovation, and healthcare digitalization on the growth of the market in these regions. The report also covers developments in foundation models, multimodal AI, retrieval-augmented generation (RAG), domain-specific LLMs, AI copilots, molecular foundation models, and automated scientific content generation, which are continuing to reshape the competitive landscape of the global generative AI in life sciences market.

The research methodology includes extensive primary and secondary research to provide market intelligence and long term forecasting. Primary research consists of structured interviews with pharmaceutical executives, biotech companies, CROs, AI software developers, cloud service providers, regulatory professionals, healthcare researchers, academic institutions, and industry experts across key global markets. Secondary research includes pharmaceutical associations, biotechnology organizations, regulatory agencies, scientific journals, company annual reports, investor presentations, AI research publications, patent databases, and authenticated market intelligence. Market estimates are developed using a combination of top-down and bottom-up methodologies and are validated through data triangulation to ensure consistency across all market segments and regional analysis. Forecast models incorporate historical pharmaceutical R&D spending, AI adoption trends, clinical research activity, technological advancements, regulatory changes, and macroeconomic indicators.

Competitive benchmarking helps in evaluating the product portfolios, AI platform capabilities, deployment models, geographical presence, R&D investments, strategic collaborations, and innovation pipelines of the key market players to provide an in-depth overview of the evolving competitive landscape of the Global Generative AI in Life Sciences Market.

Key Market Segments

By Component:

Software/Platforms

Services

By Deployment:

Cloud-Based

On-Premise

Hybrid

By Technology:

Large Language Models (LLMs)

Natural Language Processing (NLP)

Generative Molecular/Protein Models

Machine Learning & Deep Learning

Others

By Product Type:

Standalone

Integrated

By Application:

Drug Discovery & Design

Clinical Trial Design & Operations

Regulatory Writing & Submissions

Medical Affairs & Scientific Content

Pharmacovigilance

Commercial & Market Access Content

Others

By End User:

Pharmaceutical & Biotechnology Companies

CROs

Academic & Research Institutes

MedTech/Diagnostics Companies

Others

Key Market Players

NVIDIA Corporation

IQVIA Inc.

Oracle Corporation

Veeva Systems Inc.

Microsoft Corporation

Alphabet Inc.

Benchling, Inc.

Insilico Medicine

Recursion Pharmaceuticals, Inc.

Tempus AI, Inc.

Industry Trends

Generative AI is revolutionizing drug discovery, enabling investigators to create new molecules, optimize protein structures, predict drug-target interactions, and identify promising therapeutic candidates at a pace significantly faster than traditional computational methods, thus decreasing the timeline for early-stage drug development.

Large Language Models (LLMs) are increasingly adopted in life sciences workflows to automate regulatory writing, review of scientific literature, clinical documentation, generation of medical information, pharmacovigilance reporting and knowledge management with increased productivity and consistency.

Artificial intelligence-driven molecular and protein foundation models are driving precision medicine by speeding up biomarker discovery, protein engineering, antibody design and personalized therapeutic development via predictive biological modeling and large-scale genomic analysis.

Generative AI use cases include protocol design, patient recruitment, site selection, synthetic control arms, clinical document generation, and operational

optimization, all driven by clinical trial modernization. These use cases help pharmaceutical companies improve trial efficiency and cut development costs.

Pharmaceutical and biotechnology companies are increasingly leveraging scalable computing infrastructure, collaborative research environments, secure data management, and AI-as-a-service capabilities to promote innovation across the enterprise, making cloud-native AI platforms the preferred deployment model.

Multimodal AI is rapidly gaining momentum across life sciences, combining genomic, proteomic, imaging, electronic health record (EHR), clinical and real world evidence (RWE) datasets to provide deeper biological insights and enable data-driven decision-making.

AI copilots are increasingly helping scientists, clinicians, regulatory professionals, and medical affairs teams by automating repetitive documentation tasks, summarizing scientific evidence, generating technical content, and supporting complex research workflows.

As organizations increase investments in model validation, explainable AI, regulatory compliance, data privacy, cybersecurity and human oversight to ensure the safe, transparent and trustworthy deployment of generative AI solutions, responsible AI governance has become a strategic priority.

Strategic alliances between pharmaceutical companies, biotech companies, AI startups, cloud service providers, research institutions and technology companies continue to accelerate innovation through joint development of foundation models, AI-enabled research platforms and integrated digital laboratory ecosystems.

Investments in generative molecular AI, domain-specific LLMs, digital labs, autonomous research platforms, AI-enabled clinical development, precision medicine and regulatory automation are expected to accelerate innovation and support long-term growth of the global generative AI in life sciences market through 2036.

Market Determinants

Increasing Demand for Accelerated Drug Discovery and Development: Pharmaceutical and biotechnology companies are increasingly adopting generative AI to shorten drug discovery timelines, identify novel therapeutic candidates, optimize molecular design, and improve target identification. AI-driven research enables faster and more cost-effective development of new medicines while reducing early-stage research risks.

Growing Adoption of AI Across Clinical and Regulatory Workflows: Expanding use of generative AI for clinical trial design, regulatory writing, pharmacovigilance, medical affairs, scientific content generation, and clinical documentation is driving market growth. Organizations are leveraging AI to automate repetitive tasks, improve operational efficiency, and accelerate regulatory submissions.

Advancements in Foundation Models and Large Language Models: Continuous innovation in large language models (LLMs), multimodal AI, generative molecular models, natural language processing, and machine learning algorithms is significantly enhancing the ability of AI systems to generate scientifically relevant insights, analyze complex biological data, and support decision-making across the life sciences value chain.

Growing Investments in Precision Medicine and Digital Research Infrastructure: Increasing investments in genomics, proteomics, precision medicine, cloud computing, digital laboratories, and AI-enabled research platforms are creating a strong foundation for widespread adoption of generative AI technologies across pharmaceutical research, biotechnology, diagnostics, and personalized healthcare.

Data Privacy, Regulatory Compliance, and Validation Challenges: The use of sensitive clinical, genomic, and patient data requires strict compliance with healthcare regulations and robust data governance. Organizations must address model validation, explainability, privacy protection, and regulatory acceptance, increasing implementation complexity and compliance costs.

Limited Availability of High-Quality Domain-Specific Data: Effective generative AI models require access to large volumes of accurate, diverse, and well-curated biomedical data. Data fragmentation, interoperability challenges, proprietary datasets, and inconsistent data quality can limit model performance and slow AI adoption across certain life sciences applications.

Opportunity Mapping Based on Market Trends

Expansion of AI-Powered Precision Medicine and Personalized Therapeutics: Growing integration of generative AI with genomics, proteomics, multi-omics data, and biomarker research is creating significant opportunities for developing personalized therapies, precision diagnostics, targeted drug discovery, and patient-specific treatment strategies that improve clinical outcomes.

Growth of Autonomous Drug Discovery and Digital Laboratories: Increasing adoption of AI-driven laboratory automation, robotic experimentation, digital twins, autonomous research platforms, and generative molecular design is creating substantial opportunities for accelerating pharmaceutical R&D, reducing development costs, and improving scientific productivity across life sciences organizations.

Rising Demand for AI-Enabled Regulatory and Clinical Operations: Expanding use of generative AI in regulatory writing, clinical trial optimization, pharmacovigilance, medical affairs, and scientific content generation is creating opportunities for software providers to deliver intelligent AI copilots, workflow automation platforms, compliance solutions, and enterprise knowledge management systems tailored to the life sciences industry.

Expansion Across Emerging Life Sciences and Healthcare Innovation Markets: Increasing investments in biotechnology, pharmaceutical research, precision medicine, healthcare digitalization, cloud infrastructure, and AI innovation across Asia Pacific, Europe, Latin America, and the Middle East are creating substantial long-term opportunities. Companies investing in domain-specific large language models, secure cloud platforms, multimodal AI, strategic research partnerships, and validated enterprise AI solutions will be well positioned to capitalize on the accelerating global demand for generative AI in life sciences through 2036.

Value-Creating Segments and Growth Pockets

Software & Platforms Dominate the Market While Services Register the Fastest Growth

The Software/Platforms segment accounted for the largest market share of an

estimated 68.5% in 2025, driven by widespread adoption of generative AI platforms for drug discovery, molecular modelling, scientific content generation, regulatory automation, clinical analytics, and enterprise-wide AI integration across pharmaceutical and biotechnology organizations. These platforms enable researchers to accelerate target identification, optimize drug candidates, automate documentation, and improve research productivity through advanced AI capabilities. Increasing investments in digital R&D transformation, cloud-native AI platforms, and enterprise knowledge management continue to strengthen the segment's leadership across the life sciences industry.

The Services segment is projected to register the highest CAGR of 37.1% during 2026–2036, supported by rising demand for AI consulting, implementation, model customization, validation, regulatory compliance, system integration, lifecycle management, and managed AI services that facilitate enterprise-scale deployment.

Cloud-Based Deployment Leads the Market While Hybrid Deployment Witnesses the Fastest Expansion

The Cloud-Based segment held the largest market share of approximately 61.4% in 2025, driven by scalable computing infrastructure, rapid AI model deployment, collaborative research environments, cost efficiency, and seamless integration with enterprise data platforms. Cloud deployment enables pharmaceutical and biotechnology companies to access high-performance computing resources, accelerate AI-driven research, support global collaboration, and efficiently manage large biomedical datasets. Continuous growth in cloud adoption and digital transformation initiatives further reinforces the segment's market leadership.

The Hybrid segment is expected to register the highest CAGR of 36.3% during 2026–2036, supported by increasing demand for secure management of sensitive research data, regulatory compliance, flexible infrastructure, and the ability to combine cloud scalability with greater on-premise data control and governance.

Large Language Models Lead Adoption While Generative Molecular & Protein Models Register the Highest Growth

The Large Language Models (LLMs) segment accounted for the largest market share of approximately 33.8% in 2025, driven by extensive adoption for regulatory writing, scientific literature analysis, clinical documentation, medical affairs, pharmacovigilance, enterprise knowledge management, and intelligent research assistance. Life sciences organizations increasingly utilize LLMs to automate documentation, summarize

scientific evidence, improve regulatory efficiency, and enhance decision-making across research and commercial functions. Rapid advancements in domain-specific AI models continue to strengthen the segment's leadership.

The Generative Molecular/Protein Models segment is projected to register the highest CAGR of 39.2% during 2026–2036, supported by growing utilization for molecular design, protein engineering, antibody discovery, biomarker identification, precision medicine, and AI-driven drug discovery applications.

Integrated Solutions Generate the Highest Value While Standalone Solutions Experience Rapid Growth

The Integrated segment represented the largest market share of approximately 64.2% in 2025, driven by increasing deployment of generative AI across laboratory information management systems, clinical development platforms, regulatory software, electronic data capture systems, and enterprise research ecosystems. Integrated solutions enable seamless workflow automation, centralized data management, regulatory compliance, and enhanced collaboration across multiple research and development functions. Growing enterprise digital transformation initiatives continue to reinforce segment leadership.

The Standalone segment is projected to register the highest CAGR of 36.1% during 2026–2036, supported by increasing demand for specialized AI applications in molecular modeling, scientific content generation, clinical trial optimization, pharmacovigilance, and regulatory automation that address highly focused research and operational requirements.

Drug Discovery & Design Dominates the Market While Clinical Trial Design & Operations Emerges as the Fastest-Growing Application

The Drug Discovery & Design segment accounted for the largest market share of approximately 34.9% in 2025, driven by increasing adoption of generative AI to identify novel therapeutic candidates, optimize molecular structures, predict biological interactions, reduce experimental costs, and accelerate pharmaceutical research and development timelines. AI-powered molecular generation and predictive modeling are significantly improving research efficiency and success rates across biologics and small-molecule drug development.

The Clinical Trial Design & Operations segment is projected to register the highest

CAGR of 38.5% during 2026–2036, supported by growing adoption of AI for protocol optimization, patient recruitment, site selection, synthetic control arms, operational planning, clinical documentation, and intelligent trial automation that improves efficiency and reduces development timelines.

Pharmaceutical & Biotechnology Companies Lead the Market While CROs Register the Fastest Growth

The Pharmaceutical & Biotechnology Companies segment accounted for the largest market share of approximately 47.6% in 2025, driven by substantial investments in AI-powered drug discovery, precision medicine, digital R&D platforms, enterprise-wide AI transformation initiatives, and advanced clinical development technologies. Growing biologics pipelines, increasing research complexity, and rising demand for faster therapeutic development continue to accelerate generative AI adoption across pharmaceutical and biotechnology organizations.

The Contract Research Organizations (CROs) segment is projected to register the highest CAGR of 37.8% during 2026–2036, supported by increasing demand for AI-enabled clinical trial management, regulatory support, pharmacovigilance, medical writing, data analytics, and outsourced research services as pharmaceutical companies increasingly rely on specialized external partners to accelerate innovation and improve operational efficiency.

Regional Market Assessment

North America

North America is projected to dominate the global generative AI in life sciences market, accounting for an estimated 46.8% market share in 2025. The region's leadership is supported by substantial pharmaceutical research and development investments, rapid adoption of artificial intelligence technologies, advanced cloud infrastructure, and the presence of leading biotechnology companies, pharmaceutical manufacturers, and AI solution providers. The United States and Canada continue to invest heavily in AI-enabled drug discovery, precision medicine, clinical development, genomics, and digital health innovation to accelerate therapeutic development and improve research efficiency. Strong collaboration among pharmaceutical companies, research institutions, technology firms, and healthcare providers further strengthens the regional ecosystem. In addition, favorable regulatory support, growing venture capital investments, and widespread implementation of enterprise AI platforms continue to accelerate innovation

and reinforce North America's leadership throughout the forecast period.

Asia Pacific

The Asia Pacific region is projected to register the highest CAGR of 38.2% during 2026–2036, driven by expanding pharmaceutical manufacturing, increasing biotechnology research, growing government support for artificial intelligence innovation, rising clinical trial activity, and rapid digital transformation across healthcare systems. Countries including China, India, Japan, South Korea, Singapore, and Australia are strengthening AI research capabilities while investing heavily in advanced life sciences technologies and digital research infrastructure. Growing investments in precision medicine, genomics, biologics development, and AI-powered drug discovery are accelerating market expansion. In addition, supportive government policies, expanding cloud infrastructure, rising collaborations between technology companies and pharmaceutical organizations, and increasing adoption of AI across research and clinical operations are expected to create significant long-term growth opportunities throughout the region.

Europe

Europe represents a significant market for generative AI in life sciences, supported by its strong pharmaceutical industry, increasing adoption of AI-driven research platforms, well-established regulatory frameworks, and growing investments in personalized medicine and biotechnology innovation. Countries including Germany, the United Kingdom, France, Switzerland, and the Netherlands continue to expand the application of artificial intelligence across drug discovery, genomics, clinical research, pharmacovigilance, and regulatory sciences. The region benefits from extensive collaboration between pharmaceutical companies, academic institutions, research organizations, and technology providers to accelerate scientific innovation. Increasing investments in digital healthcare infrastructure, biomedical research, and data-driven clinical development are further strengthening market growth. Continuous focus on responsible AI adoption, regulatory compliance, and advanced life sciences research is expected to sustain Europe's competitive position throughout the forecast period.

LAMEA

The LAMEA region is emerging as a promising market for generative AI in life sciences, driven by increasing healthcare digitalization, expanding pharmaceutical manufacturing, growing biotechnology investments, and continuous improvements in research

infrastructure. Countries across Latin America, the Middle East, and Africa are increasingly adopting AI-enabled healthcare solutions, cloud-based life sciences platforms, and digital clinical research technologies to enhance healthcare delivery and accelerate pharmaceutical innovation. Government initiatives promoting digital transformation, increasing healthcare expenditure, and rising investments in biotechnology and precision medicine are creating favorable market conditions. Growing collaboration between global pharmaceutical companies, regional healthcare providers, and technology firms is further supporting AI adoption across drug discovery, clinical trials, and medical research. These developments are expected to generate substantial long-term growth opportunities for market participants across the LAMEA region.

Recent Developments

May 2025: NVIDIA Corporation expanded its AI infrastructure for life sciences by introducing next-generation accelerated computing platforms optimized for large language models, molecular simulation, drug discovery, and biomedical research.

April 2025: IQVIA Inc. enhanced its AI-powered clinical research solutions by integrating advanced generative AI capabilities for clinical trial optimization, regulatory documentation, patient recruitment, and healthcare analytics.

October 2024: Insilico Medicine strengthened its AI-driven drug discovery platform by expanding the use of generative AI for molecular design and target identification to accelerate preclinical drug development.

August 2024: Microsoft Corporation expanded its cloud-based AI capabilities for healthcare and life sciences through new generative AI services supporting biomedical research, clinical documentation, scientific knowledge management, and enterprise AI deployment.

Critical Business Questions Addressed

How will the Global Generative AI in Life Sciences Market evolve through 2036?

The report evaluates long-term market growth driven by increasing AI adoption in pharmaceutical R&D, drug discovery, clinical development, regulatory operations,

precision medicine, and healthcare digital transformation.

Which component, deployment, technology, product type, application, and end-user segments will generate the greatest commercial opportunities?

The study identifies the dominant and fastest-growing market segments, enabling pharmaceutical companies, biotechnology firms, AI solution providers, CROs, cloud vendors, and investors to prioritize strategic investments.

What are the primary factors driving market expansion?

The report analyzes the influence of foundation models, large language models, AI-powered drug discovery, precision medicine, clinical trial modernization, cloud computing, and digital laboratories on future market development.

Which regional markets present the strongest long-term investment potential?

The assessment compares pharmaceutical R&D intensity, AI ecosystem maturity, biotechnology innovation, cloud infrastructure, regulatory environments, and healthcare digitalization across major regions to identify the most attractive growth opportunities.

How can life sciences organizations strengthen their competitive position in the evolving industry?

The report examines strategic priorities including domain-specific AI model development, AI-enabled research platforms, secure cloud infrastructure, multimodal AI integration, regulatory compliance, and strategic collaborations to support long-term competitive advantage.

Beyond the Forecast

The generative AI in life sciences market will continue to evolve through advancements in domain-specific large language models, multimodal AI, generative molecular modeling, autonomous laboratories, AI copilots, and precision medicine platforms, enabling faster scientific discovery and more efficient pharmaceutical development.

Rising investments in AI-powered drug discovery, genomics, digital laboratories, clinical trial intelligence, regulatory automation, biomedical foundation models,

and cloud-native research ecosystems will continue creating substantial opportunities for pharmaceutical companies, biotechnology firms, CROs, AI technology providers, and healthcare organizations worldwide.

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