CIO

Provectus

Accelerating medical breakthroughs with generative AI

How Provectus streamlines workflows to accelerate the discovery of new therapies and personalized care.

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Modern medical research can deliver miraculous outcomes, but developing new treatments is a lengthy and expensive process. Bringing a new drug to market often takes more than a decade and costs over $2 billion.

A major drag on speed and cost is data. Researchers must analyze petabytes of data, which is often incomplete, fragmented, inconsistently formatted, and locked in inaccessible, unstructured formats. Before analysis can begin, this data must be extracted, standardized, de-identified, and linked across systems. These are tedious, manual processes that slow down research, increase costs, and introduce the possibility of compliance issues and errors, making research conclusions less reliable.

Researchers also need more advanced tools to query and visualize the data in real time so that they can more easily grasp its meaning and uncover patterns as questions evolve.

Accelerating workflows and opening new research avenues

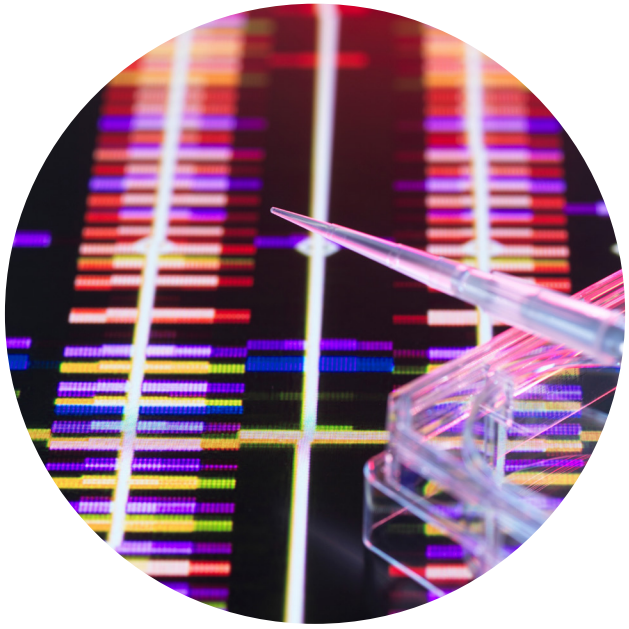
By harnessing the capabilities of AI, machine learning (ML), and generative AI (gen AI) on a cloud-based platform, organizations can break down silos and analyze large genomic and clinical datasets much faster, at scale. In this setting, gen AI assists with natural-language access to data, code and query generation, document summarization, and workflow orchestration. Traditional AI/ML models power cohorting, feature extraction, and outcome scoring. Together, they shorten the path from raw data to insights.

Gen AI is a key component in early-stage drug discovery. Generative models help design novel molecular structures and simulate likely interaction profiles, while complementary predictive models score properties such as binding affinity or toxicity. These in-silico explorations help teams prioritize candidates for laboratory testing.

In personalized medicine, AI models compare a patient's genomic and clinical profile with large cohorts of prior responders and non-responders to stratify who is most likely to benefit from a therapy. Results still require clinical validation, but the decision process moves faster and with greater confidence.

Building a user-friendly, scalable genomics database

A biotech company that develops genetic testing for early cancer detection illustrates the difference AI can make. The organization wanted to streamline variant annotation, unify genomic and clinical data at scale, and provide researchers with self-service analytics, making it easier to analyze and share information across R&D teams.



The company engaged AI consultant and solutions provider Provectus to develop a scalable, cost-effective clinical genomics database solution. Provectus migrated datasets and pipelines to Amazon Web Services (AWS), unified and harmonized petabyte-scale data, and built a governed, analysis-ready layer. At its core, the delivered solution uses AWS HealthOmics for genomics data storage and processing, Amazon Athena for serverless querying, and Amazon QuickSight for self-service visualization. Amazon Bedrock enables gen AI-assisted access to data and documentation through natural language, with the option to tailor prompts and, where supported, select and fine-tune models.

The clinical genomics database solution enabled the company to unify and harmonize petabytes of genomic and clinical data, reducing processing time by 300% and cutting costs per sample in half. Researchers now run interactive queries for large cohorts in seconds instead of hours. The teams collaborate on a single, trusted data foundation with clear lineage and access controls.

Furthermore, the company's researchers can now:

- Analyze the data from entire populations in seconds.
- Ask questions about the data and receive answers in natural language, instead of using formulas or requiring assistance from data scientists.
- Select between different gen AI models to improve their output in different tasks.
- Easily discover new insights, thanks to quick access to data patterns at scale.

Improving pharmaceutical research and clinical trials

The clinical genomics database solution benefits the company's biopharma partners. With governed, self-service access to high-quality datasets, partners can screen for their own potential drug-drug or drug-target interactions earlier in the research cycle and focus laboratory work on the most promising candidates.

For clinical development, the solution supports cohort discovery and trial feasibility by helping identify patients who may meet inclusion criteria or are more likely to respond based on molecular signatures and prior outcomes. By analyzing real-world evidence and results from previous trials, teams can now refine protocols and improve the probability of success much faster. The AWS HealthOmics backbone supports high-throughput analysis pipelines and can scale to tens of thousands of results per day.

A fruitful relationship

The Provectus and AWS partnership ensures that pharmaceutical and life sciences companies benefit from enterprise-grade architecture and early access to innovative AWS services that align with industry best practices. Provectus can help design and build gen AI prototypes, test and validate their

hypotheses, and scale the solutions enterprise-wide quickly and efficiently, saving money and speeding the time to business value.

The result of collaboration with Provectus is a practical path from petabytes of data to research-critical insights: faster annotation, interactive cohort analysis, and gen AI-assisted workflows that reduce manual effort while preserving the governance required for healthcare and life sciences.

A robust platform is key to transforming genomic and clinical data into real-world insights. Learn more about how Genomics Data Platform can elevate your R&D operations.