

Molecular Testing Engine

Production-grade secondary analysis and bioinformatics for scaling clinical diagnostics



Health systems face mounting pressure to expand NGS test menus, consolidate labs, and reduce turnaround times—without increasing headcount or regulatory risk. As panels grow from hundreds to thousands of genes and multimodal data becomes the norm, homegrown bioinformatics stacks buckle under the weight of accumulated technical debt.

The DNAexus Molecular Testing Engine eliminates this operational drag for health systems by providing a unified, production-ready platform that scales clinical molecular testing reliably and compliantly—from assay validation through high-throughput operations.

KEY TAKEAWAYS

- **Scale Without Headcount:** Expand test menus and throughput without adding bioinformatics or IT staff by replacing brittle DIY pipelines with a managed, production-grade platform.
- **Built-In Clinical Compliance:** Ensure every result is reproducible, auditable, and inspection-ready with an out-of-the-box CAP/CLIA-aligned foundation.
- **Operational Resilience at Scale:** Support large panels (1,500+ genes), multimodal workflows, and multiple sequencers without breaking pipelines or rebuilding infrastructure.

THE REAL-WORLD CHALLENGE

Clinical molecular labs are facing a compounding operational crisis:

- **Technical Debt Spiral:** Custom scripts and point solutions fail as test menus expand and assay complexity increases.
- **Compliance Risk:** Maintaining auditability, data security, and regulatory readiness becomes costly and error-prone in DIY environments.
- **Talent Bottlenecks:** Highly trained bioinformaticians spend time maintaining infrastructure instead of developing new clinical tests.
- **Data Fragmentation:** Multiple sequencers and instruments create silos that slow processing and complicate standardization.
- **Undervalued Operations:** Bioinformatics is mission-critical—yet labs are consistently expected to do more with fewer resources.

The result: slower turnaround times, rising operational costs, and limited ability to scale diagnostics sustainably.

THE SOLUTION:

A Production-Grade Omics Data Engine

The DNAnexus Molecular Testing Engine is a unified, cloud-native platform designed specifically for health systems conducting clinical diagnostics at scale. It automates the full lifecycle of molecular testing—from R&D validation to routine clinical production—while eliminating the fragility of bespoke infrastructure.

Instead of patching pipelines and managing servers, labs gain a standardized, compliant foundation that grows with their testing strategy.

KEY CAPABILITIES

- **Unified Execution Engine:** Process outputs from any sequencing hardware in one environment—eliminating silos and simplifying operations.
- **High-Throughput Automation:** Scale pipelines and sample volumes without expanding infrastructure or rebuilding workflows.
- **Out-of-the-Box Compliance:** A future-proof regulatory foundation aligned to CAP/CLIA requirements, reducing audit burden and inspection risk.
- **Reproducible Clinical Pipelines:** Standardized workflows ensure every patient result is consistent, traceable, and defensible.
- **Intelligent Resource Optimization:** Gain visibility into compute and storage usage per case to forecast costs as volumes grow.
- **Expert Services Enablement:** Professional services support onboarding, pipeline configuration, and optimization—so teams are productive immediately.

USE CASE: SCALING COMPLEX CANCER PANELS

An NCI-designated cancer center is expanding from small targeted panels to large RNA-Seq and custom oncology panels while consolidating lab operations.

Instead of rebuilding pipelines for each new assay, the lab deploys the Molecular Testing Engine to centralize analysis across instruments, automate production workflows, and standardize results.

The outcome: faster onboarding of new panel versions, reduced operational overhead, and a foundation capable of supporting both clinical diagnostics and translational research.

QUANTIFIABLE IMPACT*

- Up to 2x throughput without adding new headcount*.
- ~40% reduction in pipeline development time.
- Significant cost avoidance by replacing multi-FTE DIY maintenance models.
- Improved turnaround time predictability across expanding test menus.

**Based on internal benchmarks. Customer results may vary.*

Why DNAnexus

DNAnexus brings decades of experience operating regulated, large-scale genomic platforms for healthcare and life sciences. The Molecular Testing Engine applies that expertise to the realities of clinical lab operations in the modern health system—where reliability, compliance, and scale matter more than bespoke customization.