



Case Study Anthology



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Case Studies

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Building a Data Infrastructure for Next-Generation Cell Therapies

Adicet Bio is broadening the horizons of cell immunotherapy with gamma delta ($\gamma\delta$) T-cells. Adicet employs these cells' unique properties to target solid tumor cancer. Though gamma delta T-cells make up a small fraction of blood cells, Adicet has developed a platform to activate and expand these cells for function in the clinic.



Jeannette Grant

Associate Director of Project Management, Adicet

Challenges

With data scattered across paper notebooks, employee computers, and public drives, Adicet Bio lacked a comprehensive data management infrastructure, which made it difficult to access and secure their data.

Adicet's previous data management platform struggled to provide varying levels of access permissions to data for the stratified teams across their various sites.

As Adicet rapidly scaled the their staff's size and the complexity of their research and development process, they needed to be able to organize and standardize their data capture and record keeping.



Applications Used



Notebook



Molecular
Biology



Registry



Inventory



Workflows



Insights

Key Benefits

Ensured data integrity for IND filing

Adicet Bio has secured its data's integrity by storing, centralizing, and compiling it within Benchling. This comprehensive data management prepares Adicet to efficiently file for IND.

Flexible permissions structure

Adicet has two separate research sites, along with a team of contractors. With Benchling's data access features, Adicet can flexibly turn data and folder permissions on and off, depending on teams' needs.

Company-wide organizational structure

Adicet standardizes data entry and organizes data with configurable templates and entry guidelines for Notebook and Registry. These best practices provide



Ensuring data integrity for regulatory submissions

- After adopting Benchling, all of Adicet's data types are unified on a cohesive data layer. Entities and results are connected to context-rich Notebook entries via bio-intelligent links.
- Because Benchling applications are natively unified, an Adicet scientist can record entities in Notebook and the downstream teams can access it in Registry, creating a complete experimental history of the entity.
- With Benchling, Adicet now has a comprehensive data management structure that ensures data accuracy and validity as they file for IND and ultimately move therapies from the lab to the clinic.

Configuring access permissions for a global organization

- Adicet Bio has fully functional sites in California and Israel. These two sites operate both independently and in conjunction, and Benchling has helped them establish unique permissions structures respective to the sites' needs.
- Benchling allows Adicet to have tiered access permissions: read-only, append and write, and administrate. They can now specify access level to data, projects, within Benchling's applications.
- Adicet now has the flexibility to provide consultants and other team members access to folders relevant to their work without having to share the entire Adicet database.

Establishing an infrastructure to scale

- With Benchling, Adicet now has an organizational infrastructure that standardizes their project folder structure and data entry to document experimental history.
- Benchling enables Adicet to cultivate best practices with guidelines for Notebook entries and entities in Registry that decrease busywork, foster collaboration, and enable data querying.
- Adicet has tripled in size in the past year, and they are still growing. Adicet uses their data capture standards in Benchling to train new and existing employees, providing an organizational foundation that will fortify Adicet as they scale in process and team size.

“Ultimately what Benchling is going to allow Adicet to do is to move rapidly into the clinic with lifesaving therapies, and it has set up the company for long-term success in the future.”

Jeanette Grant, Associate Director for Project Management

Building a Global Informatics Infrastructure

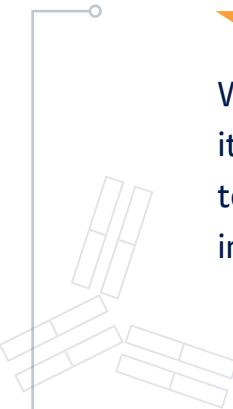
Agenus is a global biopharmaceutical company with multiple immunotherapy and vaccine pipeline programs. The company employs scientific staff spread across four discovery, screening, and characterization facilities around the world.



Cherylene Plewa

Senior Director of Molecular Biology, Agenus

Challenges



Without unified systems, it was difficult for scientists to effectively find and share information.

Globally-distributed R&D team impeded team collaboration.

Complexity of R&D workflows exacerbated difficulties tracking samples and experiments.

Applications Used



Notebook



Registry



Molecular
Biology



Insights

Key Benefits

Centralizing experimental data

Benchling replaced Agenus's multiple informatics systems with a single, end-to-end platform where they track all of their experiments, results, and samples.

Tracking across international sites

Benchling made all institutional knowledge accessible to scientists across the globe, dramatically streamlining data transfer and sample tracking.

Mining success patterns

Agenus mines data across past experiments to determine which factors led to success and optimize future experimental design.

Results

Achieving shorter timelines with seamless collaboration

- At any given time, Agenus's scientists can see the experiments, results, and proteins of their colleagues.
- By knowing every experiment done previously and which reagents have been produced, scientists can review and plan experiments much faster.
- Across the board, Agenus as a company is accelerating their timelines.

Answering any question about any sample across international sites

- With complex workflows, scientists input initial information and capture every subsequent detail as experiments transfer across groups and sites.
- For a given protein, Agenus knows which cell line produced it, which sequence engineered the cell line, and which processes took place.
- Agenus knows exactly how every candidate was derived without any ambiguity.

Learning more from every experiment

- Agenus reviews their historical data to understand what distinguishes each of their molecules.
- For example, certain peptides are more difficult to synthesize than others. Agenus mines patterns across these peptides to determine what predicts difficult synthesis.
- Agenus works even faster by proactively applying these learnings. They predict which proteins will be more difficult to synthesize and adjust their processes accordingly.

“Biologics R&D is an environment that's very difficult to integrate data across, but Benchling gives us access to all of it.”

Dennis Underwood, VP Molecular & Informatics Systems

Optimizing Biomaterials R&D with Data-Driven Insights

Bolt Threads is a biomaterials company developing sustainable fabrics. Bolt's Microsilk is a bioengineered fiber that replicates the properties of spider silk. Mylo is a leather-like material derived from mycelium cells. Bolt Threads aims to address global material waste with fabrics that consume fewer resources in production.



Patrick Johnson

Deven Dharm, Director of Software Engineering,
and Patrick Johnson, Systems Analyst, Bolt Threads

Challenges

Bolt used a multitude of silos to capture project data, scattering their records and clouding their ability to both find specific data and see that data in its larger context.

Bolt's legacy tools required time intensive preparation to use, involved repetitive manual data entry, and made collaboration logistically challenging – all of which slowed progress and hindered efficiency.

Bolt's previous system of managing information was not flexible enough to handle the evolving nature of their R&D workflows and couldn't keep pace with the rate of their scientists' innovation.

Applications Used



Notebook



Molecular
Biology



Registry



Inventory



Workflows



Requests



Insights

Key Benefits

A Single, Universal Source of Truth

Bolt's data is now centralized entirely within Benchling, which provides their organization a universal source of truth for all experimental data across their R&D teams.

Streamlined Project Oversight

All of Bolt's scientists and teams can collaboratively track and manage both individual tasks and overarching projects so that information handoffs are simplified, output can scale up, and multi-step development processes are more streamlined.

Rapid iteration to Empower Innovation

Bolt and Benchling work together to implement, configure, and adapt Bolt's R&D cloud as their established processes evolve and areas of research expand.

Results

Leveraging data centralization for deeper insights

- Benchling's suite of applications is unified on a single data layer, so Bolt eliminates data silos and gives scientists access to data from across their organization.
- Bolt integrated their data visualization tool into the Benchling SQL warehouse so that their project data can be analyzed for performance and improvement.
- Bolt scientists can now track the end-to-end lineages of their entities, from proteins, to plasmids, to final products, giving scientists and decision makers deeper insights that accelerate discovery.

Driving efficiency and streamlining operations

- Previously, Bolt's core groups stored data on instruments or paper. With Benchling Requests, Bolt scientists share results data directly with request submitters, making project handoffs seamless.
- Bolt integrated their data visualization tool into the Benchling SQL warehouse so that their project data can be analyzed for performance and improvement.
- Individual scientists and entire scientific teams use Benchling to oversee and coordinate their interconnecting, multi-step functions, which both streamlines the overarching Bolt pipeline and simplifies each stage within it.

Flexibility that ensures success for today and tomorrow

- During and after Bolt's adoption of the Benchling platform, the companies partnered to configure and optimize Benchling's tools to meet the specific needs of all the scientific teams at Bolt.
- When Bolt's biochemistry team recently emerged in their R&D pipeline, Benchling was flexible enough to integrate with the team's novel and complex workflows, and iterate as they evolve.
- Benchling's adaptability empowers Bolt scientists to develop new materials, like mycelium- derived "leather", and discover their novel uses. With Benchling's support for rapid process iteration, Bolt can optimize their processes in lockstep with their scientists' innovation.

“Benchling became a universal source of truth and a super flexible system that allowed us to evolve rapidly.”

Deven Dharm, Director of Software Engineering, Bolt Threads

Optimizing Cell Engineering with a Unified Informatics Platform

Rubius Therapeutics is genetically engineering red blood cell therapeutics, or RCTs, to treat a range of diseases. These RCTs are capable of targeting cancer through activating immunity, treating auto-immune diseases through self-antigen tolerance induction, and combating rare enzyme deficiencies by introducing therapeutic enzymes that are cellularly shielded.



Tiffany Chen

Director of Discovery, Rubius

Challenges

Manual record keeping systems that housed all experimental data – including donor metadata, DNA stock, and prototype protein expression – were disorganized and cluttered, hindering cross-team collaboration.

Legacy request management protocols were inefficient and required scientists and managers to search through scattered, disparate records on cell cultures and quality control assays.

Engineering processes were out of sync and difficult to track as a result of decentralized systems of information storage and unreliable reporting on project progress.

Applications Used



Notebook



Molecular
Biology



Registry



Inventory



Workflows



Requests



Insights

Key Benefits

Cross-team Collaboration with Complete Experimental Context

Rubius stores, shares, and interlinks all the experimental data of their samples, vectors, and engineered red blood cells in Benchling. Now, Rubius effortlessly navigates from sequences to prototype backgrounds and experimental conditions.

Insightful Request Management

Rubius now streamlines their request fulfillment process, ultimately using this information to track experiment status and forecast needs in real-time.

Centralized Project Management

With Benchling Workflows, Rubius structures, executes on, and optimizes their cell engineering processes- from DNA production to cell construction.

Results

Fostering collaboration with interlinked data

- Rubius designs therapeutic DNA sequences in Benchling, stores that data in the Benchling Registry, then links it to upstream experimental records as well as downstream entities.
- With Benchling, Rubius tracks the DNA candidates used to produce lentivirus and interlinks these data to downstream virus batches.
- Rubius uses the Benchling ecosystem to house all of their project inputs and outputs on one integrated platform, cohering experimental data and powering collaboration.

Seamlessly filing and tracking requests

- With Benchling, teams can queue and structure requests, allowing them to anticipate project needs and more efficiently assign upcoming tasks.
- Rubius biology teams request information on prototypes, the cell engineering team receives and executes on these requests, and the cells are then referred back to the original teams for processing, seamlessly within Benchling.
- Benchling Requests gives Rubius real-time visibility into laboratory needs and resources, which in turn affords them insights into step-wise planning and preparation for cell production.

Unifying and iterating on complex cell engineering processes

- Rubius scientists collaboratively manage the cell engineering stages by performing protocols and communicating results within and across stages — on one unified platform.
- Whether a project is in design or production, different groups at Rubius can configure their own Benchling workflows and flexibly iterate on them to optimize project progress.
- Benchling Workflows enables Rubius to actively manage and track their entire RCT pipeline in real-time — from discovery to engineering — ultimately expediting project progress.

“Benchling is a very powerful system. The one thing I’ve heard from most of the scientists is that it’s more powerful than they realize all the time.”

Tiffany Chen, Director of Discovery, Rubius Therapeutics

Accelerating Synthetic Biology with Fully Unified Informatics

Synlogic is creating a novel class of living medicines. By genetically altering non-pathogenic bacteria found naturally in the human gut, Synlogic's medicines perform specific functions within the microbiome. Therapeutic synthesis can occur within the microbiome itself, without radically changing the human microbiota.



Scott Hamilton

Senior Lead Process Engineer, Synlogic

Challenges

Legacy software couldn't keep pace with Synlogic's need for rapid process iteration, putting the onus on scientists to manage manual data entry across disparate systems.

Disparate systems of record for fermentation data hindered analysis and reporting, delaying critical business decisions.

Without a central place to store the data produced by their bioreactors, scientists spent significant time tracking people down and sending emails.

Applications Used



Notebook



Molecular
Biology



Registry



Workflows



Requests



Insights

Key Benefits

One-Click Solution for Fermentation

After completing a reactor run, Synlogic's data is automatically uploaded and structured in Benchling and tied to its relevant experimental workflow.

Automated Visualizations

By leveraging the Benchling API, Synlogic automatically generates visualizations of their fermentation data. With these visualizations, they can track fermentation trends over time of individual and multiple fermentations.

Centralized Fermentation Requests

Synlogic's core platform development team runs fermentations for the rest of the organization. With Benchling, requesters see progress in real-time and can directly access and visualize their results the instant the data is compiled.

Structuring and unifying assays

- During and after fermentation runs, Synlogic's scientists use Benchling to run numerous assays to gauge characteristics such as optical density, cell health, and potency.
- Benchling Workflows structures these assays into trackable stages that automatically associate assay data to the fermentation run that it corresponds to.
- By unifying assay data and fermentation data, Synlogic improves scientist productivity and eliminates inaccurate and missing data.

Automating and visualizing fermentation runs

- Synlogic uses Benchling to automatically link bioreactor data to experiments.
- Through Benchling's APIs, Synlogic integrated their reactor software with Benchling. Fermentation data is automatically uploaded to Benchling and then automatically visualized through an integration with third-party data analysis software.
- By automating data centralization and visualization, Synlogic has built a "one click solution" for fermentation. They're able to make more informed decisions around process development much more quickly than ever before.

Centralizing and streamlining fermentation requests

- Groups across Synlogic rely on the platform development team to run fermentations for them. With Benchling, these groups have a single system to place fermentation requests and access data the moment it's generated.
- With Benchling Requests, requesters specify desired inputs and other experimental parameters. Taking advantage of the automations they've developed, Synlogic fulfills these requests and shares results and visualizations without any downtime.
- Groups throughout Synlogic get the results they need faster than ever before and no longer depend on outdated methods to work together.

"We looked at a number of different LIMS systems to help manage our process development, but I don't think any of this would have been possible without Benchling."

Scott Hamilton, Senior Lead Process Engineer

Enhancing Research Productivity by 30%

Arcturus Therapeutics is an industry leader in RNA medicines. The company's aim is to use its versatile, breakthrough RNA platform to develop novel therapies for rare diseases for which there are no adequate treatments. Arcturus collaborates with Janssen Pharmaceuticals and Ultragenyx Pharmaceutical.

Challenges

Lack of standardized molecular design tools hindered ability to collaborate.

Legacy ELN was cumbersome and led to low scientist usage. It took an average of 10 days for experimental data to make it into the system, if at all.

No standard data store and sequence repository scattered data and prevented institutional knowledge capture.



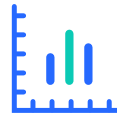
Applications Used



Notebook



Molecular
Biology



Insights

Key Benefits

Molecular Biology Collaboration

With Benchling's unified cloud platform, Arcturus scientists design sequences together and share plasmids and annotations.

Unprecedented Adoption

Arcturus saw a dramatic increase in the speed of data entry. Experiments are recorded on the same day they occur, not 10 days later as they previously were.

Productivity Boom

With Benchling as the central source of truth for their organization, Arcturus has seen a 30% increase in research productivity.

Results

Ease of use naturally generates widespread adoption

- Arcturus transitioned from a legacy ELN with 20-30% user adoption, to 90% adoption with the Benchling Notebook.
- With its rich protocol repository and direct Molecular Biology integration, Arcturus uses the Notebook as an active tool in research, not only as a system of record after-the-fact.
- Time to data entry reduced from 10 days to 1 day.

Centralized data shortens research timelines

- With Benchling, scientists at Arcturus waste no time searching for data.
- Benchling has allowed scientists to reallocate more than 30% of their day-to-day work towards science, rather than note-taking and searching data.
- These productivity gains, coupled with the transparency of the Benchling system, mean that Arcturus generates decision-quality results faster.

Backing up decisions with data

- Over time, Arcturus has built up and refined their protocol repository, so they can continue to produce higher-quality results even faster.
- Arcturus's scientists trace the full experimental history behind every piece of data to re-create their experiments according to rigorous protocols.
- When deciding which candidates to advance, Arcturus places their confidence in the step-by-step experimental histories in Benchling.

“I’ve never seen this level of utilization with any molecular biological suite or electronic lab notebook. People love using it.”

Christian Cobaugh, Director of Drug Discovery

Integrating the Custom Solutions of a Technology Powerhouse

Zymergen is an industrial biotechnology company that engineers microbes to produce high-value commercial molecules. The company employs many custom software systems and algorithms that allow their scientists to push the boundaries of strain engineering.



Challenges

With many siloed pieces of custom software, it was difficult for scientists to enter and extract data.

Scientists in the strain optimization and fermentation & production teams couldn't share complete experimental context.

Zymergen's disparate systems couldn't scale with their rapidly growing company.

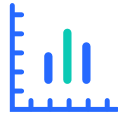
Applications Used



Notebook



Molecular
Biology



Insights

Key Benefits

Integration Innovation

Zymergen uses Benchling as a central platform to unite their custom tools. Proprietary algorithms, instruments, and niche software all integrate into Benchling.

Complete Experiment Histories

From every plasmid to every fermentation run, Zymergen's scientists view and share a complete, step-by-step data trail.

Organic Growth and Onboarding

Since starting with 10 Benchling users, Zymergen's deployment has grown to over 140 users, with ongoing onboarding handled completely internally.

Unifying custom tools on a central informatics platform

- Zymergen integrates custom sequence analysis algorithms with Benchling, eliminating data import/export.
- By integrating automated data capture across plate groups, Zymergen populates notebook entries with data in real-time.
- With centralized functional data, analysis, and records, the speed with which Zymergen generates decision-quality results is a competitive advantage.

Collaborating seamlessly across teams

- Zymergen scientists share and collaborate on the same up-to-date plasmids.
- Protocols and templated Notebook entries enforce SOPs across the Zymergen organization.
- Production teams review upstream strain optimization teams' work to inform their own processes.

Scaling and optimizing processes over time

- Given how intuitive Benchling is, Zymergen has been able to handle all software training internally.
- Rich protocol versioning empowers Zymergen to optimize their processes by comparing results across conditions.
- As the company has scaled, more of their clients share classified data.
- Benchling's permissions features intelligently restrict data access.

“Benchling has been a model partner for us as we have grown our business. We would highly recommend Benchling to any growing biotechnology or life science firm.”

Jed Dean, Cofounder

Customer Briefs

OBSDIAN



INHIBRX

Intellia
THERAPEUTICS

Unlocking Pivotal R&D Answers While Ensuring Data Integrity

Obsidian Therapeutics is developing a suite of technologies that allow for control of protein activity within cells to power therapeutics.

Challenges

- 1 Previous ELN was clunky and didn't allow for linkages to registered samples, hindering adoption and experimental detail.
- 2 Without a formal registration system, Obsidian scientists couldn't draw connections between results data and upstream entities.
- 3 Legacy sample tracking system was unintuitive and saw low scientist usage, leading to data loss and compliance concerns.



 **Vipin Suri**
Vice President of Discovery, Obsidian

Key Benefits

- ▶ **Unified Informatics**
Integrated sample tracking and notetaking generated strong user adoption and improved the quality and reliability of experimental records.
- ▶ **Centralized Registration**
Obsidian can trace from downstream results to identify effective upstream entities. "Why does this lentivirus work well? Is it related to a specific batch of constructs?"
- ▶ **Secure Data**
With Benchling's robust Bioregistry that rewards scientist usage, Obsidian can be confident that the constructs, parts, and other entities they're tracking will hold up in a court of law.



Structuring World-Class Informatics for a New Team

Incyte develops a wide range of therapeutics, primarily for oncology. Benchling supports their antibody discovery group.

Challenges

- 1 Incyte's antibody discovery group was starting from the ground-up and knew it would be pivotal to deploy a world-class informatics system as soon as possible.
- 2 With a growing team and fluid processes, the antibody discovery group needed a flexible system, or else their data would be unreliable and difficult to track.
- 3 Being able to work with external collaborators (including international collaborators) was a must.

Key Benefits

- ▶ **Data Clarity from the Start**
Since the start of their operations, the antibody discovery group has gotten visibility into their key processes.
- ▶ **Tracking Constructs and Components**
Benchling's ability to automatically identify and register scFvs' components makes it easy to track constructs.
- ▶ **Secure Data for Collaborations**
With Benchling's rich data permissions, Incyte can extend the system to its external collaborators, streamlining secure data transfer.
- ▶ **Long-Term Success**
By gathering the right data in the right way from the start, the antibody discovery group is set up for long-term informatics success.

Centralizing Biologics Data for a Growing Company

Inhibrx develops multivalent costimulatory agonists, checkpoint inhibitors, and therapeutics to invert the tumor microenvironment toward local immune activation.

Challenges

- 1 Without a formal tracking system, plasmid maps were distributed across multiple scientists' computers. Finding the right plasmid map would involve walking through the lab to find the right scientist.
- 2 Spreadsheets were used to track requests and information about plasmids, requiring extensive manual search and limiting user compliance.
- 3 Experimental notes were taken using a shared paper lab notebook, making it difficult to find experimental details and extract insights.

Key Benefits

- ▶ **Reliable Registration**
The Benchling Bioregistry is a central source of truth for plasmids and enforces uniqueness constraints to ensure data integrity.
- ▶ **Interlinked Experimental Details**
Scientists can link batches to relevant experiments, so their notes directly reflect all of the products and data they've generated.
- ▶ **Setting up New Teams for Success**
Inhibrx built out a new process development team and onboarded them onto Benchling, where they can access the data of upstream teams.
- ▶ **Streamlined IND Filing**
Inhibrx uses Benchling Lab Notebook entries and unique Lab Notebook IDs to file for IND, saving months of time and effort.

Streamlining Registration and Requests for Gene Editing

Intellia is developing CRISPR/Cas9-based gene editing therapeutics with *in vivo* and *ex vivo* delivery models.

Challenges

- 1 Previous registration took place across SharePoint spreadsheets, emails, and paper, leading to unreliable data and outsize time spent piecing together lineages.
- 2 Plasmid repositories couldn't be tracked and kept up to date.
- 3 Lack of a formal request system led to lost requests and insufficient detail in requests. Without a reliable plasmid inventory, certain requests were difficult to complete.

Key Benefits

- ▶ **Centralized Registration**
Standardized lists of plasmids and other entities make data reliable and easily shared.
- ▶ **Streamlined Request Triaging**
With Request Management, teams generate greater throughput and higher quality products because they can easily access the information they need.
- ▶ **Generating R&D Insights**
Workflow Management empowers Intellia to identify the upstream entities that lead to successful batches. For example, Intellia can answer, "Which bio-vector led to this particularly effective protein batch?"



Benchling

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