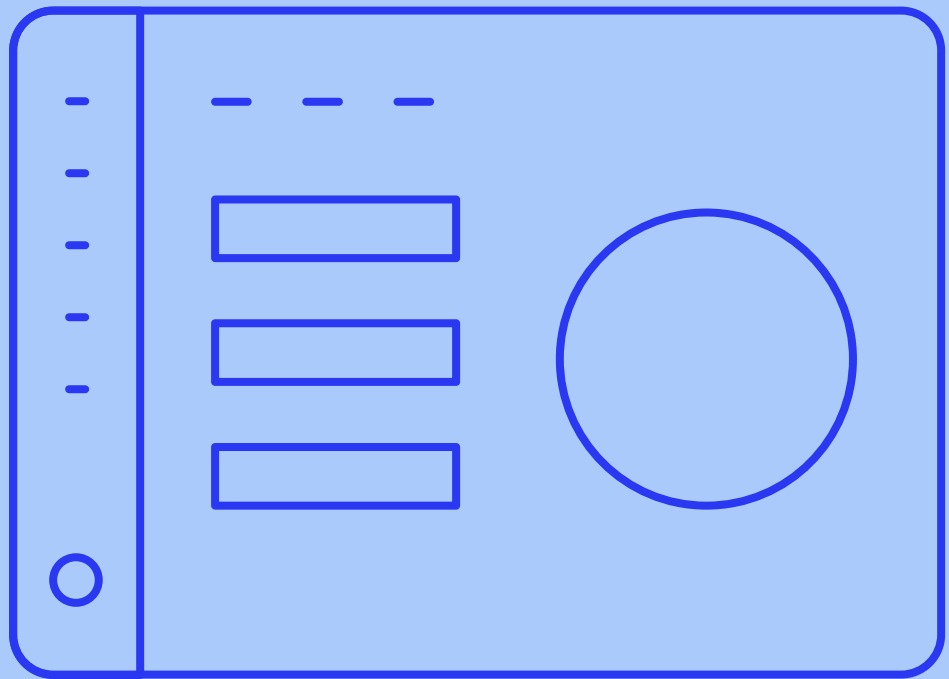


Benchling Life Sciences R&D Cloud

Brochure



Benchling

Accelerating the Pace of
Life Sciences R&D

Introduction

Advances in biotechnology are transforming almost every aspect of our lives — from the medicines we take, to the food we eat, the crops we grow, and the materials we use every day.

Not surprisingly, the scientific techniques and R&D operations needed to bring these innovations to market are constantly evolving and growing in complexity. As a result, the scale and speed at which R&D data is generated are growing exponentially.

To continue making these innovations a reality, life science organizations need to fully embrace a digital transformation that will enable them to integrate their R&D data systems, develop more robust scientific platforms, and achieve more productive collaboration.

Unfortunately, the legacy software that R&D teams have historically used holds them back, siloing data and creating bottlenecks that stall their progress.

It's time for R&D software to catch up to the science it's intended to support.

Enter Benchling.

The Benchling Difference

If you're currently relying on paper lab notebooks, word processing docs, and spreadsheets that aren't purpose-built for your science, legacy ELNs and LIMS that silo your data, or custom-built systems that require constant IT upkeep, your entire organization is operating at significantly lower efficiency than it could be otherwise. So why Benchling?

Built for Complex Science

Purpose-built to support the development of anything from biologics and biomaterials to strains and small molecules, Benchling interlinks your sequences, samples, and experiment results to ensure full traceability.

Adapts to Your Process

Built on top of a secure, high-performance cloud infrastructure, Benchling supports evolving scientific workflows and integrates with lab instruments and other software systems to help unify your R&D data ecosystem.

Intuitive and Easy to Use

Benchling's modern user interface — with natively interconnected notebook, sample registration, inventory management, and workflow design applications — means your team can work better and faster, together.

Enables Data-Driven Decisions










Centralized, standardized data capture and storage help ensure the integrity of your data, while integrated analytics tools help you derive the insights you need to make better scientific and operational decisions.

“What Benchling has provided us is a single solution for multiple different problems, from sequence design and alignment to a centralized database. Our speed has doubled, communication has improved exponentially, and it’s decreased scientist frustration.”



Brenda K. Minesinger, PhD
Principal Scientist

Benchling Life Sciences R&D Cloud

Applications	 Notebook Ensure documentation completeness and compliance	 Molecular Biology Accelerate DNA and amino acid design, at scale	 Registry Standardize, connect, and contextualize sample data
	 Inventory Track and manage every sample and reagent	 Workflows Drive R&D efficiency with orchestrated process management	 Insights Translate R&D data into actionable insights
Platform	 Codeless Configuration Rapidly configure and deploy without needing to code	 Benchling for Lab Automation Automate instrument orchestration and data acquisition	 Developer Platform Unify your entire R&D data ecosystem

Notebook

Ensure Documentation Consistency, Completeness, and Compliance

Standardize experiment documentation

Develop a library of Notebook entry templates with predefined protocols, checklists, and tables to standardize how your team performs and documents any number of experiments.

Avoid data recording errors

With pre-configured, structured data capture tables, you can ensure that experiment results are recorded the same way for each respective assay, by every team member.

Eliminate knowledge silos

Register and update the usage of samples and reagents in real-time directly within your Notebook entry, so each sample or entity is always accompanied by its complete history.

Notebook streamlines experiment documentation, collaboration, and knowledge transfer — all while ensuring your teams remain in compliance with organizational SOPs and regulatory requirements.

- Customizable entry templates
- In-line entity registration and inventory management
- Configurable, assay-specific data capture tables
- Audit trails and version control
- 21 CFR Part 11 compliant e-signatures

Production and QC of IgM Lots EXP20001958

Inputs

	samples	Request ID	Task	Mark for redo	Date Requested By
1	AbDemo	bioprocessing1	Transfection	<input type="checkbox"/>	2020-05-05
2	AbDemo	bioprocessing1	2L Bioreactor Run	<input type="checkbox"/>	2020-05-05
3	AbDemo	bioprocessing1	Affinity Chromatography	<input type="checkbox"/>	2020-05-05
			EC50 Antigen	<input type="checkbox"/>	

Right-hand panel (Metadata):

- INFORMATION TAGS
- Name: Production and QC of IgM Lots
- Folder: IGM PRODUCTION
- Update Information
- Comment
- Retract
- Archive
- Export entry

Molecular Biology

Accelerate Sequence Design and Analysis, at Scale

Streamline sequence design across teams

High-throughput in silico tools increase research efficiency — every sequence can be referenced in any Notebook entry, while retaining their full experimental context and history.

Ensure proper sequence utilization

Benchling automatically captures and maintains a history of every modification to every sequence. At the same time, read-only permissioning allows you to control who can modify sequences.

Trace sequence relationships end-to-end

Define relationships between every primer, insert, construct your team uses, and interconnect sequences with strains, cell lines, and other downstream products to ensure full traceability.

Molecular Biology combines over a dozen DNA and amino acid design tools to help improve the speed, accuracy, and fidelity of your discovery programs.

- Golden Gate and Gibson assembly
- Primer design with secondary structure prediction
- DNA and amino acid alignment
- Amino acid translation, codon optimization, and back translation
- Antibody sequence annotation with CDRs, framework regions, etc.
- CRISPR guide RNA design

The screenshot displays the 'Bulk Assemble DNA' interface in Benchling. It features a workflow diagram with three main steps: 'Backbone', 'Insert', and 'Finalize', connected by arrows. Below the workflow, there is a list of 'Backbone Plasmids' including RepCap-Gene004, Helper-Gene006, and Transfer -Gene005. A 'Backbone Summary' table is shown on the right, detailing the sequence, fragment, left sticky, length, and right sticky for Helper-Gene006. The table indicates a circular plasmid with EcoRI and PvuI sites, a length of 12753, and sticky ends 'at' and 'aatt'. At the bottom, there is a section for '2. Select fragment direction' with radio buttons for 'Forward' (selected) and 'Reverse'.

SEQUENCE	FRAGMENT	LEFT STICKY	LENGTH	RIGHT STICKY
Helper-Gene006		at	12753	aatt

Registry

Standardize, Connect, and Contextualize Every Sequence and Sample

Standardize registration for diverse entities

Record pertinent information about the composition and properties of every sequence, sample, and entity in your lab, and define enforceable constraints to ensure every registered entity is unique.

Ensure end-to-end sample traceability

Define relationships between specific sample types — sequence to cell line to mouse model — to ensure the full lineage of any registered entity can be traced.

View sample & experiment data in context

Embeddable results tables enable you to record and automatically connect every piece of experiment data to the samples from which those data were produced.

Registry is an agile sample intelligence management system that harmonizes the way you collect, structure, and analyze all the sequence, sample, and experiment data in your lab.

- Code-free interface for defining scientific entities and metadata
- Configurable assay- and process-specific data capture tables
- Configurable auto-linking of entities and data
- Parent-child sample lineages
- Configurable media and formulation component schema

The screenshot displays the Benchling Registry interface for a sample named 'CPA 47 + Prolif'. The interface is divided into two main sections: METADATA and RESULTS.

METADATA Section:

- Schema:** A dropdown menu is set to 'Cell Culture'. A note below states: 'Cannot change schema of registered entities'.
- Table:** A table with two columns: 'FIELD' and 'VALUE'.

FIELD	VALUE
Cell Concentration (cells/mL)	10000
Temperature Grown	37.5
Cell Line	CPA 47
Media Used	Proliferation Media Batch
Volume of Media Used (mL)	1000
- Custom Field:** A section with a 'FIELD' column and a 'VALUE' column, currently empty.

RESULTS Section:

- Cell Line Characterization:** A table with columns: Sample ID, Western Blot, FISH stain Image, DNA Gels, and NGs.

	Sample ID	Western Blot	FISH stain Image	DNA Gels	NGs
1	CPA 47 + Prolif				
2	CPA 47 + Prolif				
- Culture Yield:** A table with columns: Sample ID, Yield (g), Primary Productivity, and Creator.

	Sample ID	Yield (g)	Primary Productivity	Creator
--	-----------	-----------	----------------------	---------

Inventory

Track the Location and Utilization of Every Sample and Reagent

View sample & experiment data in context

Easily locate items with Inventory's visual interface, and organize containers into worklists to transfer samples and reagents between collaborators.

Connect physical samples to experiments

View all the samples that were used and produced in a particular experiment, and view all of the data — and associated experiments — that were ever generated from that particular sample.

Simplify location tracking

Support for label printing means you can integrate Benchling with your lab's barcode scanner and pull up any sample's full experimental history with a single click.

With Inventory, you can keep track of the amounts, concentrations, and physical locations of any samples and reagents stored in your lab.

- Custom storage types (e.g. cryovials, boxes, freezers)
- Media and formulation mixture component and lot tracking
- Aliquot lineage tracking and linking with experiment results
- Customizable worklists for organizing samples and reagents
- Barcode generation, scanning, and label printing

The screenshot displays the Benchling Inventory interface. On the left, a sidebar contains navigation icons. The main area is titled 'Cell Lines' and shows a 'Barcode' of 'FB001' and a 'Location' of 'Cell Line and Culture Tube Freezer'. Below this is a grid of sample locations, with columns 1-10 and rows A-H. The grid shows various sample IDs and their corresponding container types. To the right of the grid is a table of containers, including columns for Position, Container, Volume, Cell Culture, and Cell Line. The table lists several containers, such as CR017, CR018, CR019, CR020, and CPA 47, with their respective volumes and cell culture conditions.

Position	Container	Volume	Cell Culture	Cell Line
2 A2	CR017	700 uL	CPA 47 + FBS	
3 A3	CR018	700 uL	CPA 47 + FBS	
4 A4	CR019	800 uL	CPA 47 + Seru...	
5 A5	CR020	800 uL	CPA 47 + Seru...	
6 A6	CPA 47	1000 uL		CPA 47
7 A7	CR021	800 uL	CPA 47 + Seru...	

Workflows

Drive R&D efficiency with orchestrated process management

Increase productivity across specialized teams and programs

Workflows provides scientifically-aware project management and is an engine for collaboration. The flexible data model and UI supports simple request management through complex, multi-team programs.

Identify and resolve bottlenecks to improve efficiency

Operational data provides visibility so managers can clear hurdles and refine processes in order to reach milestones faster.

Increase data visibility across studies to drive process intelligence

Workflows makes it possible for users to bring together experimental, sample, and process results from across an organization. Aggregated data can surface key operational and scientific insights, further improving success rates and accelerating timelines.

Support the complex, collaborative work across specialized R&D teams with Workflows.

- Task management for serial, parallel, and nested workflows
- Data standardization and aggregation for comparing results across runs
- Real-time process visualization for tracking work status
- Task execution with structured templates for process control and repeatability
- Traceability of methods, samples, and registered inventory across stages

The screenshot displays the 'Workflows / Upcoming cell core team tasks' interface. A table lists tasks with columns for ID, Schema, Assignee, Status, Scheduled on, and Program. A filter modal is open, showing filters for 'Responsible team' (Cell core), 'Status' (Pending), and 'Scheduled on' (2021-09-13 to 2021-09-17). The table shows 6 items, with the first 5 visible.

ID	Schema	Assignee	Status	Scheduled on	Program
TTR1-T1	Titer	ashoka			
TTR2-T2	Titer	mimi			
TC6-T442	Cell line request	ashoka			PR-A1
TC6-T368	Cell line request	ashoka	Pending	9/14/2021	PR-A1
TC6-T92	Cell line request	ashoka	Pending	9/14/2021	PR-A1
TC6-T468	Cell line request	mimi	Pending	9/14/2021	PR-A1

Insights

Translate R&D Data into Actionable Insights

Extract scientific intelligence in real-time

Build scientific dashboards to analyze experiment results and trace the lineage of each data point back as far as the sequence that was used to create a cell line or other entity.

Leverage data to optimize operational efficiency

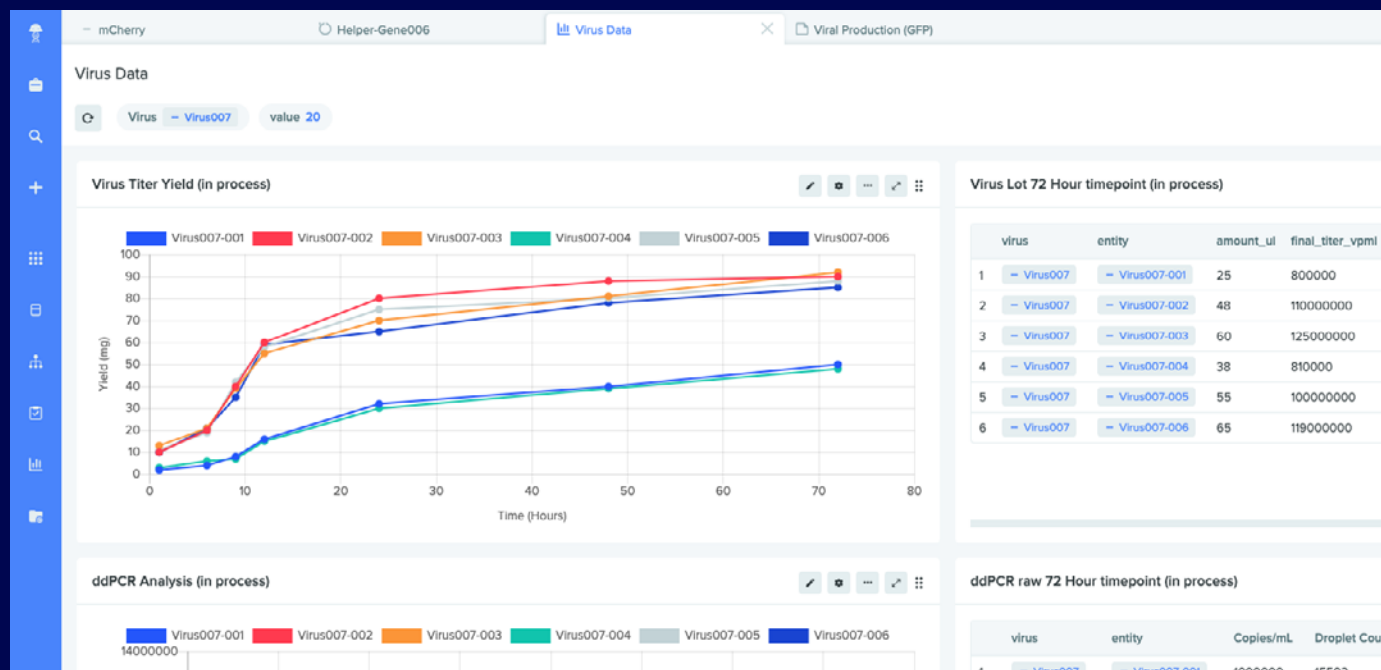
Dive deeper into resource utilization and compare process variations to identify opportunities to improve program throughput, yield, and quality.

Track and manage organizational performance

Gain visibility into progress at the individual and group levels. Ensure team compliance with process review standards, and monitor teams' output velocity and quality.

Drawing conclusions from R&D data is a snap with Insights. Analyze, visualize, and report on data from every sequence, sample, experiment, and process with easy-to-build dashboards.

- Dataset viewer with previewing, filtering, and sorting capabilities
- Query builder for quickly identifying and running analytics
- Data visualization with charts (e.g. table, bar, line, and scatter plots)
- Configurable dashboards with real-time updating

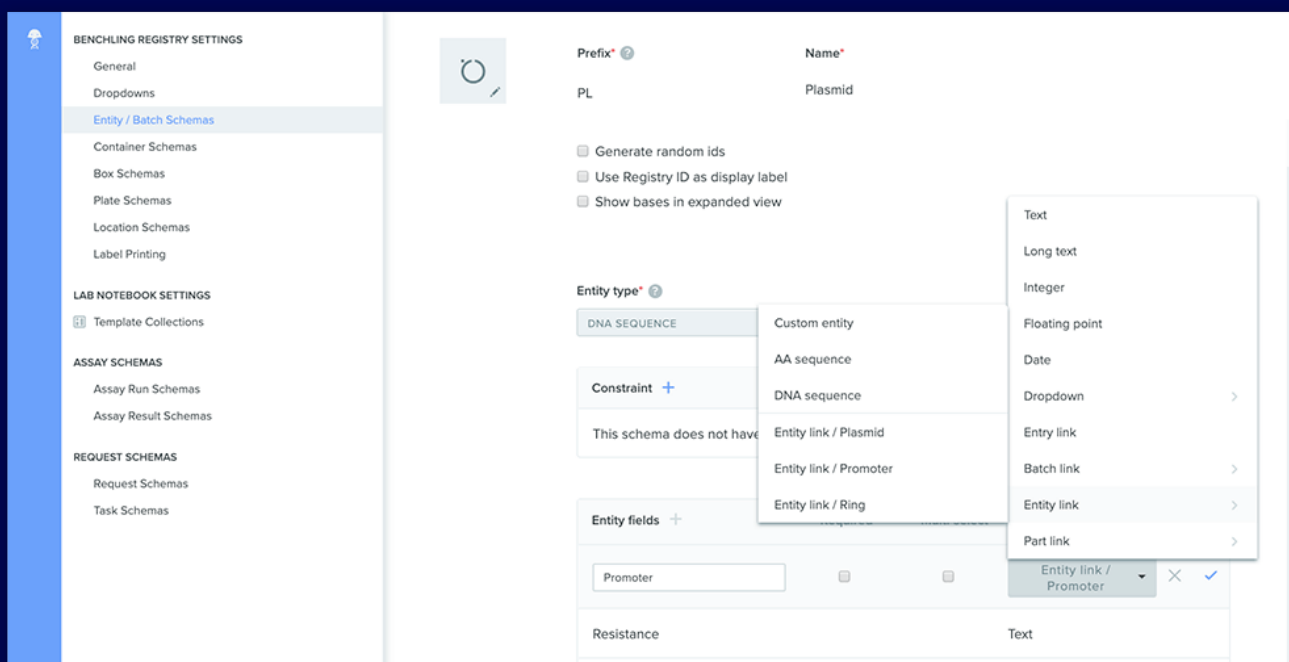


Codeless
Configuration

Rapidly Configure and Deploy Without Needing to Code

With no-code, UI-based configuration, Benchling allows you to quickly and easily adapt the system to fit your team and processes — no matter how quickly they grow and evolve. Codelessly configure:

- Notebook entry templates
- In silico entities
- Assay-specific data tables
- Inventory storage types
- Multi-step processes
- User permissions



Benchling for Lab Automation

Automate Lab Instrument Orchestration and Data Acquisition

Simplify instrument orchestration

Kick off instrument runs with a single click — define instructions that include sample data and preconfigured, instrument-specific input parameters to reduce errors and artefacts.

Reduce errors from manual data transfer

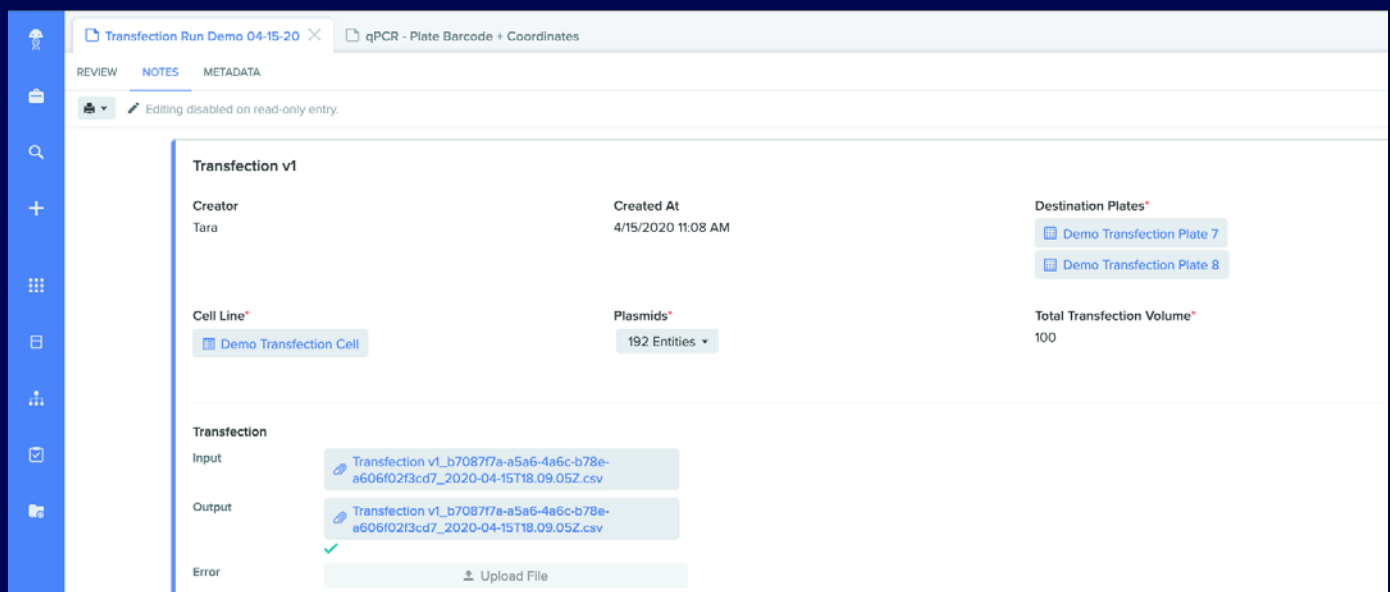
Run outputs can be automatically pulled into Benchling upon completion of your instrument runs, with results data automatically synced to predefined, structured data tables.

Retain full data integrity at high-throughput

Registered and inventoried sequence, sample, and reagent volumes are automatically created and updated in lab automation workflows from start to finish.

With Benchling for Lab Automation, automatically ingest, parse, and append data from liquid handlers, plate readers, and other instruments.

- Out-of-the-box integration with liquid handlers like PAA, Tecan, and Hamilton
- In-app interface for defining liquid handler operation and processing rules
- Liquid handler instruction generation directly within Notebook entries
- Standardized assay- and instrument-specific data capture tables
- Automatic data ingestion, parsing, and appendage of results and entities



Developer Platform

Unify Your Entire R&D Data Ecosystem

Centralize data across informatics systems

Use the API to build integrations that automatically pull and push data out of Benchling to ensure all your systems are kept up-to-date with complete, accurate data.

Automate workflows with custom logic

Subscribe to events that allow you to automatically trigger the next step in an informatics workflow, automate instrument interaction, or sync changes to an external database.

Extend platform capabilities with 3rd-party apps

Connect your proprietary software to support specialized workflows, and securely connect to analytics tools like Tableau and Spotfire to create charts and dashboards from Benchling data.

Integrate software, databases, and instruments with the Benchling Developer Platform to centralize and synchronize your R&D data and processes.

- Create, run, update, delete (CRUD) access via Benchling's REST API
- Events system for automatically triggering actions in Benchling and connected systems
- Read-only, SQL Data Warehouse for storing Benchling- and instrument-generated data

The screenshot displays the Benchling Developer Platform interface. On the left is a sidebar with a navigation menu. The main content area is titled 'BulkGet registered entities' and includes a 'SUGGEST EDITS' button. Below the title, there is a URL: `https://benchling.com/api/v2/registries/registry_id/register-ed-entities:bulk-get`. The interface is divided into sections for 'PATH PARAMS' and 'QUERY PARAMS'. The 'PATH PARAMS' section shows `registry_id*` as a string. The 'QUERY PARAMS' section shows `entityRegistryIds` as a string, with a description: 'Comma separated list of entity Registry IDs'. At the bottom, there is a 'Response' section. On the right side of the interface, there is a 'cURL' section with a cURL command and a status bar showing '200 OK' and '400 Bad Request'. Below the status bar is a JSON response snippet.

CORE RESOURCES

- DNA Sequences >
- Oligos >
- AA Sequences >
- Custom Entities >

REGISTRY

- Registry Resource
- List registries
- BulkGet registered entities**
- Registration >
- Batches >

MOLECULAR BIOLOGY

- DNA Alignments >

INVENTORY

- Containers >
- Plates >
- Boxes >

BulkGet registered entities SUGGEST EDITS

`https://benchling.com/api/v2/registries/registry_id/register-ed-entities:bulk-get`

PATH PARAMS

`registry_id*` string

QUERY PARAMS

`entityRegistryIds` string
Comma separated list of entity Registry IDs

Response

cURL

```
curl https://benchling.com/api/v2/registries/src_NetYd96a/registered-entities:bulk-get?entityRegistryIds=pBN000,sBN000 \
-u sk_YOUR_SECRET_KEY:
```

200 OK 400 Bad Request

```
{
  "entities": [
    {
      "aliases": [],
      "annotations": [],
      "archiveRecord": null,
      "bases": "GATTACA",
      "createdAt": "2017-04-18T05:54:56.247545+00:00",
      "creator": {
        "handle": "lpasteur",
        "id": "ent_jDKamp0S",
        "name": "Louis Pasteur"
      },
      "customFields": {
        "test": {

```


Trusted Partner to Leading Life Science R&D Organizations

Benchling enables high-impact life science R&D across hundreds of commercial, government, and academic organizations around the globe.

We've developed our platform in close coordination with R&D teams to ensure that no matter your science — from strain engineering and fermentation to cell therapy development, antibody engineering, and everything in between — the Benchling Life Sciences R&D Cloud will support the work you do.

Our professional services teams leverage three pillars of customer success to deliver the right solution for your organization:

Deep life sciences domain knowledge across different R&D modalities.

Proven implementation methodology and best practices for R&D data management.

Rapid prototyping and user testing to build the right solution for your organization.



Learn how Benchling can accelerate the pace of your R&D innovation.
Visit benchling.com.