



# General Overview

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## About LakePharma

- LakePharma is a US-based Biologics CRDMO with operations in CA, MA, and TX.
- This biotech company specializes in the production and evaluation of DNA vectors, viral vectors, cell lines, proteins, antibodies and conjugates, while providing integrated solutions bridging discovery, engineering, development and GMP manufacturing.
- LakePharma has contributed to the development of 200+ therapeutic or diagnostic products and strives to do hundreds more.
- During the COVID-19 pandemic, LakePharma became a key player in supplying COVID-19 reagents and in vaccine development and GMP manufacturing.

# Key Features about LakePharma

- End-to-end solution provider from discovery to GMP manufacturing
- Comprehensive biologics production platforms
- Close partnership with clients to deliver on projects
- Workflow-based operation supported by industry-leading enterprise software system
- Relentless in technology innovation and capability expansion to meet clients' needs

**LakePharma featured in *Pharma Tech Outlook*, April 2021**

[LakePharma: The Face of Next-Gen Drug Development](#)

**LakePharma featured in *Genetic Engineering & Biotechnology News*, July 2019**

[Setting New Standards for CRO/CDMO Industry](#)

# LakePharma Provides Integrated Solutions for Biologics Development



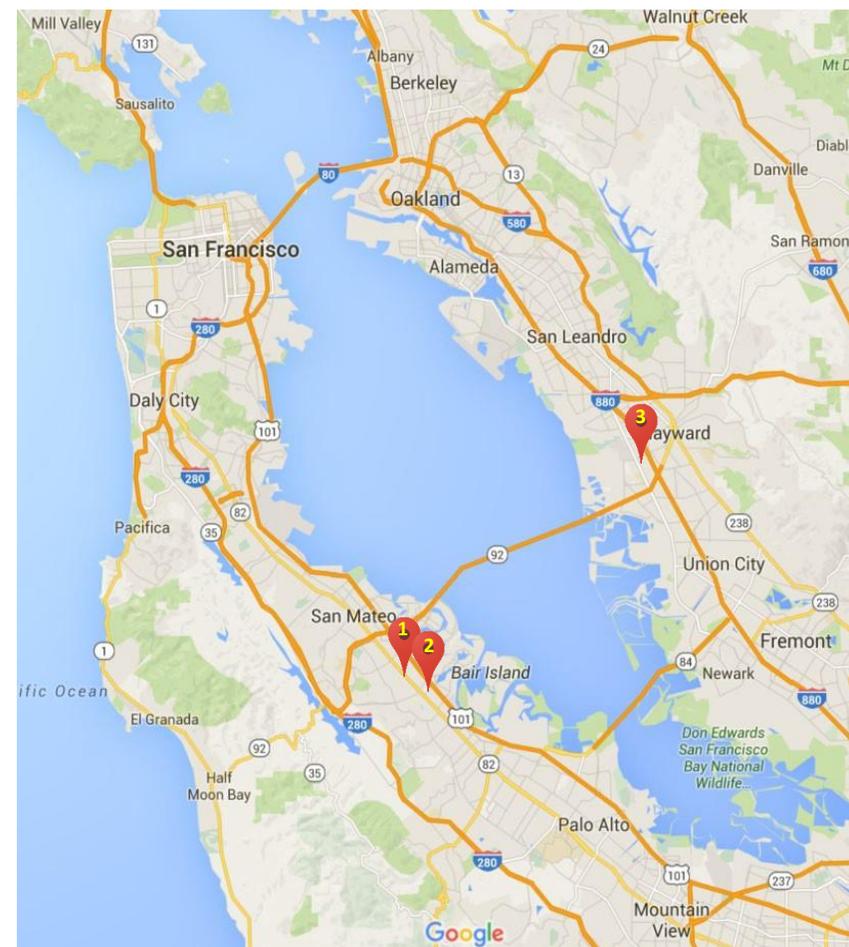
- Each LakePharma facility has a distinct focus, while collaborating closely with seamless integration

# Five Lab Facilities

San Carlos, CA	Belmont, CA	Hayward, CA	Worcester, MA	Hopkinton, MA
Antibody Discovery	Protein Engineering	Development + Manufacturing	Vector Engineering	Development + Manufacturing
Antibody discovery with multiple technology platforms	DNA cloning and production	CHO-GSN™ stable cell line development	DNA cloning and production	Process development
Antibody characterization Octet, Carterra, DSC	High-throughput antibody reformatting and production using Tuna293™ and TunaCHO™	Upstream, downstream process, analytical and formulation development	AAV and lentivirus engineering and production	GMP production, GMP QC lab including USP sterility and bioburden testing, bioassay and analytical testing and method validation
Antibody developability	Protein and antibody production and characterization	GMP manufacturing of ASR	Virus process development and analytical testing	Biorepository (GMP)
<i>De novo</i> antibody sequencing by mass spec	Bioassay and analytics	Protein conjugation and bioassay development	Vector applications including CAR T and stable cell line generation	Bioassay and analytics

# Three LakePharma Sites in the Bay Area

- Belmont site (2009 – present)
- San Carlos site (2014 – 2017, 2018 – present)
- Hayward site (2016 – present)

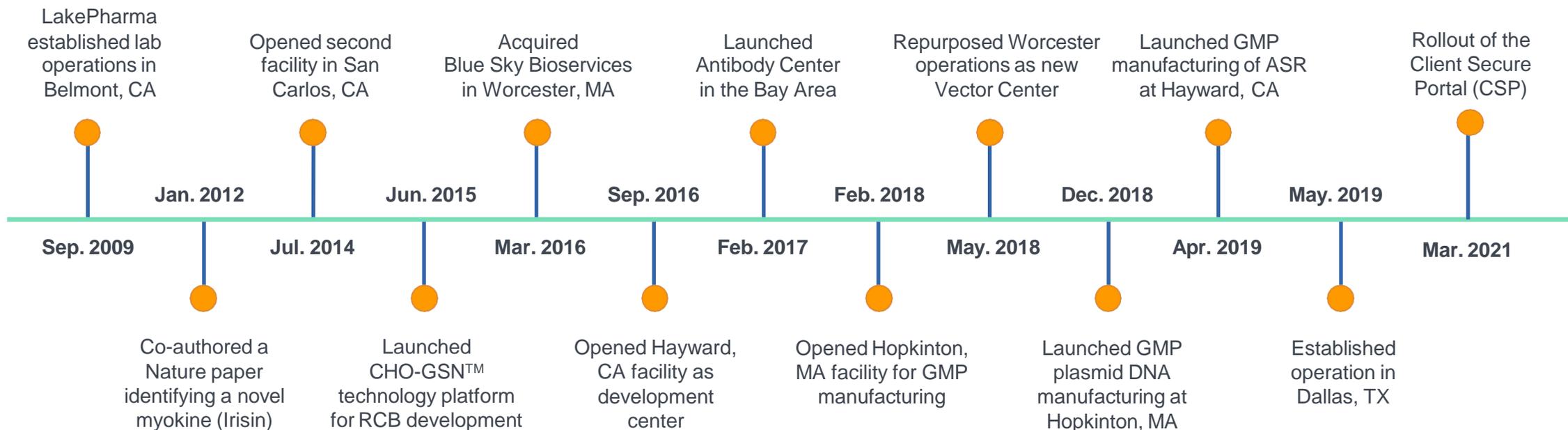


# Two LakePharma Sites in the Boston area

- Worcester site (2003 – present)
- Hopkinton site (2018 – present)



# Major Milestones



# Technical Leaders



**Norm Garceau, Ph.D.**  
Chief Scientific Officer



**John Manzello**  
Chief Manufacturing Officer



**Lisa Alexander**  
VP, Quality & Regulatory



**Xiong Gao**  
VP, Lab Operations



**Bill Hermans**  
VP, Technical Operations



**Jordon Wang, Ph.D.**  
VP, Technology Development



**Brian Zabel, Ph.D.**  
VP, Discovery Immunology

**Margaret Wong, Ph.D.**  
**Doug Demian**  
**Jason Pratt, Ph.D.**

Senior Director, Antibody Engineering  
Senior Director, Pharma Assay & Analytics  
Senior Director, Vector Technology

**Roy Hegedus, Ph.D.**  
**Kexin Huang, Ph.D.**

Scientific Director, Vector Technology  
Scientific Director, Protein & Analytical Sciences

**Minna Ranniko**  
**Dan Connors**  
**Li Wang**  
**Wenjing Chen, Ph.D.**  
**Yang Shao, Ph.D.**  
**Lloyd Yu, Ph.D.**

Director, Manufacturing Solutions  
Director, GMP Manufacturing  
Director, BioExpression  
Director, Process Development  
Director, Quality Operations  
Director, Portfolio Management

# Significant Protein Bioanalytical Capability at Multiple Sites

- Antibody and protein high throughput analytics and mass spec in San Carlos, CA
- CMC development analytics in Hayward, CA and LP Hopkinton, MA
- Additional nucleic acid analytics in LP Hopkinton, MA



**Protein Simple iCE3**



**Agilent 1260 Infinity II**



**ACQUITY UPLC**



**QTOF Mass Spec**



**LabChip GXII Touch HT**



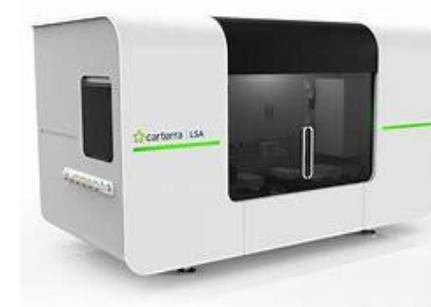
**UNcle**



**Beckman Coulter PA800Plus**



**Nano DSC**



**Carterra LSA**

# LakePharma DPM System Enables Seamless Data Integration

- LakePharma DPM was built using **RENKOM RTS™** as development platform
- Single enterprise platform that manages all data and workflows
- ERP, CRM, supply chain, facilities, quality, documentation, training, data and sample storage
- System and modules are built to 21 CFR Part 11 compliance for GMP operation
- Clients can log on to view project and interact with LakePharma project team in real time



Account	Emp	Loc	Position	Contract	Rate	Start Date	End Date	Status	Reason	Total	Target	Actual	Variance	Status
091-4000	Willy Hernandez	001	200	World Courier	1,523.00	2019-07-14	2019-07-14	Clas	Clas	1,523.00	1,523.00	1,523.00	0.00	Clas
091-4000	Rajeev Laxmi	001	200	PharmaSci	6,535.00	2019-07-14	2019-07-14	Clas	Clas	6,535.00	6,535.00	6,535.00	0.00	Clas
091-4000	Harshdeep	001	200	PharmaSci	3,300.00	2019-07-14	2019-07-14	Clas	Clas	3,300.00	3,300.00	3,300.00	0.00	Clas
091-4000	Uthra	001	200	PharmaSci	1,193.00	2019-07-14	2019-07-14	Clas	Clas	1,193.00	1,193.00	1,193.00	0.00	Clas
091-4000	Phanis Lakshmi	001	200	PharmaSci	3,100.00	2019-07-14	2019-07-14	Clas	Clas	3,100.00	3,100.00	3,100.00	0.00	Clas
091-4000	Open Geneva 376	001	200	PharmaSci	3,120.00	2019-07-14	2019-07-14	Clas	Clas	3,120.00	3,120.00	3,120.00	0.00	Clas
091-4000	Jane Tang	001	200	PharmaSci	3,235.00	2019-07-14	2019-07-14	Clas	Clas	3,235.00	3,235.00	3,235.00	0.00	Clas
091-4000	Langdon Peng	001	200	PharmaSci	3,750.00	2019-07-14	2019-07-14	Clas	Clas	3,750.00	3,750.00	3,750.00	0.00	Clas
091-4000	Juan Plaza	001	200	PharmaSci	3,280.00	2019-07-14	2019-07-14	Clas	Clas	3,280.00	3,280.00	3,280.00	0.00	Clas
091-4000	Langdon Peng	001	200	PharmaSci	3,950.00	2019-07-14	2019-07-14	Clas	Clas	3,950.00	3,950.00	3,950.00	0.00	Clas
091-4000	Open Geneva 376	001	200	PharmaSci	3,194.00	2019-07-14	2019-07-14	Clas	Clas	3,194.00	3,194.00	3,194.00	0.00	Clas
091-4000	Open Geneva 376	001	200	PharmaSci	3,400.00	2019-07-14	2019-07-14	Clas	Clas	3,400.00	3,400.00	3,400.00	0.00	Clas
091-4000	Open Geneva 376	001	200	PharmaSci	3,400.00	2019-07-14	2019-07-14	Clas	Clas	3,400.00	3,400.00	3,400.00	0.00	Clas
091-4000	Open Geneva 376	001	200	PharmaSci	3,300.00	2019-07-14	2019-07-14	Clas	Clas	3,300.00	3,300.00	3,300.00	0.00	Clas
091-4000	Open Geneva 376	001	200	PharmaSci	3,190.00	2019-07-14	2019-07-14	Clas	Clas	3,190.00	3,190.00	3,190.00	0.00	Clas
091-4000	Open Geneva 376	001	200	PharmaSci	3,400.00	2019-07-14	2019-07-14	Clas	Clas	3,400.00	3,400.00	3,400.00	0.00	Clas
091-4000	Open Geneva 376	001	200	PharmaSci	3,100.00	2019-07-14	2019-07-14	Clas	Clas	3,100.00	3,100.00	3,100.00	0.00	Clas
091-4000	Open Geneva 376	001	200	PharmaSci	3,400.00	2019-07-14	2019-07-14	Clas	Clas	3,400.00	3,400.00	3,400.00	0.00	Clas

# More Functionalities, All Connected to DPM

## Client Secure Portal (CSP)

The CSP interface features a search bar at the top and a sidebar with navigation options like 'My Projects', 'My Quotas', and 'My Production Requests'. The main area displays a table of project entries with columns for ID #, Title #, Status, Director #, Account Manager #, Project Manager #, Created Date, Start Date, and Completion Date. The status bar at the top indicates 'Created', 'In Progress', 'Completed', and 'On Hold'.

## SAM (Scientific Application table)

The SAM interface shows a 'RAT Table' with a search bar and a table of records. The table columns include RAT Record #, Type, Sample Name, TP Number, SR Number, Submitter, Time of Submission, and Time of Results. The interface is part of the LAKEPHARMA system.

## Scientific data charting page

The charting page displays a 'Chromatogram' plot with a single prominent peak. The plot is titled 'CE Size of TP 38424\_A\_0047-48190 on 2021-03-19'. Below the plot are various controls for X-axis, Y-axis, and peak detection, along with a 'Submit' button and an 'Export to RAT' option.

## Enterprise Instant Messaging System

The messaging system interface includes a sidebar with a list of channels and a main chat window. The chat window shows a '9 am call group' with a search bar and a list of messages from participants like Sarah Addams and Jesse DeSimone.

## Construct design tool

The Construct design tool interface features a circular genome map on the left and a detailed sequence alignment view on the right. The alignment view shows multiple sequence reads aligned to a reference sequence, with various annotations and a table of sequence identifiers below.

## Gantt chart tool

The Gantt chart tool displays a project schedule with a grid of tasks and their durations. The tasks are represented by horizontal bars of different colors, showing the timeline of various activities and their dependencies.

# Case Studies

- Development of *in vitro* glycoengineering ([Roche](#))
- Purity and Identity Characterization of Adeno-Associated Virus Capsid Particles by Intact and Bottom-Up Based Liquid Chromatography-Mass Spectrometry Methods ([Case Study 10300](#))
- Development of PentaMice antibody discovery platform ([Webinar on Pentamice](#))
- Development and manufacturing of ASR for biomarker studies
- Rapid development of SARS-CoV2 spike protein reagents for diagnostic applications ([Mount Sinai](#))
- Discovery and manufacturing of novel SARS-CoV2 antibodies for COVID-19 diagnostics ([Apollos](#))
- Development and manufacturing of a novel COVID-19 protein vaccine ([Akston](#))
- Development of LP-635, a novel protein nanoparticle as a nasal COVID-19 vaccine
- Proprietary non-viral gene therapy platform
- Development of suspension baculo cell culture as a better production platform for AAV