LIFE SCIENCE WASHINGTON

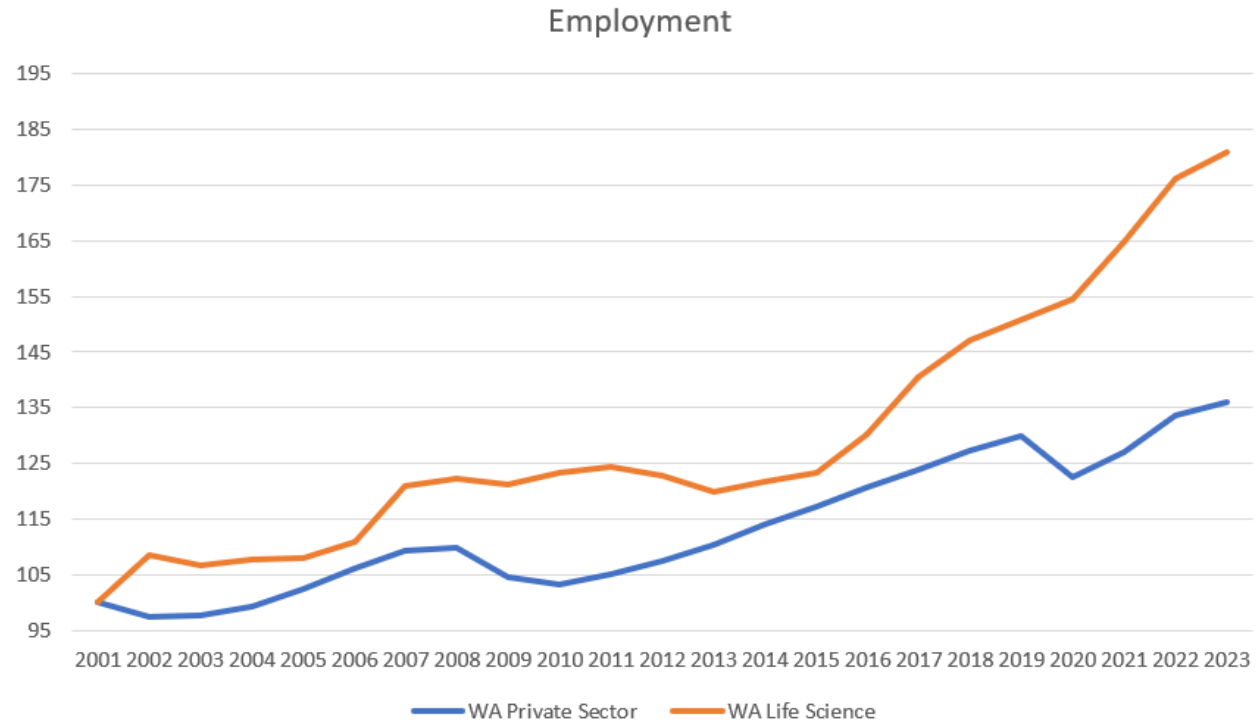
Sustaining Washington's Leadership in Life Sciences

House Technology, Economic Development & Veterans Committee

March 28, 2025

Washington Has Built One of the Nations Top Life Science Clusters

Washington state's life sciences industry has a long, proven track record of innovation built on decades of research, collaboration, and investment. **We didn't get here by accident;** it's the result of strategic vision and dedicated talent.



*Life science employment has provided a buffer during the last three recessions

Research Institutions

University of Washington
WSU Health Sciences
Fred Hutch Cancer Center
Institute for Systems Biology
Seattle Children's Research Institute
Allen Institute
Benaroya Research Institute

Supportive Policy

- ~~Life Sciences Discovery Fund~~
- ~~R&D Tax Credit~~
- ~~Washington Global Health Fund~~
- ~~State R&D Tax Incentives~~
- ~~Biotechnology & Medical Device Manufacturing Tax Incentive~~
- Andy Hill CARE Fund

Building a Life Science Company is a Long, Expensive Journey: Seagen's Story

Seagen's journey highlights the high cost, long timelines, and uncertain outcomes of life sciences innovation.

- **Massive R&D Costs**
  - Seagen invested $3.1B in R&D over 20+ years, exceeding its total revenue.
- **Lengthy Approval Process**
  - Took 13 years (1998–2011) to achieve FDA approval for its first drug.
- **High Failure Rate**
  - Out of 17 projects, only one reached the market; 9 drug candidates were discontinued.
- **Reliance on Partnerships**
  - Licensing and collaborations provided crucial funding and expertise.
- **No Profitability but Still Robust Employment**
  - Despite revenue from licensing, Seagen has never turned a profit.
- **Success Usually Comes at the End**
  - Sold to Pfizer in 2023 for $43B
  - Others partner, license, or another financial exit

Homegrown Industry Developed Over Decades

Seagen® (1997) → Pfizer (2023)

JUNO THERAPEUTICS (2013) → Bristol Myers Squibb (2018)

ALDER BIOPHARMACEUTICALS (2004) → Lundbeck (2019)

SonoSite® (1998) → FUJIFILM Value from Innovation SONOSITE (2012)

ATL (1980) → PHILIPS (1998)

Adaptive biotechnologies®

Sana Biotechnology®

prevencio Power of AI to Prevent the Preventable

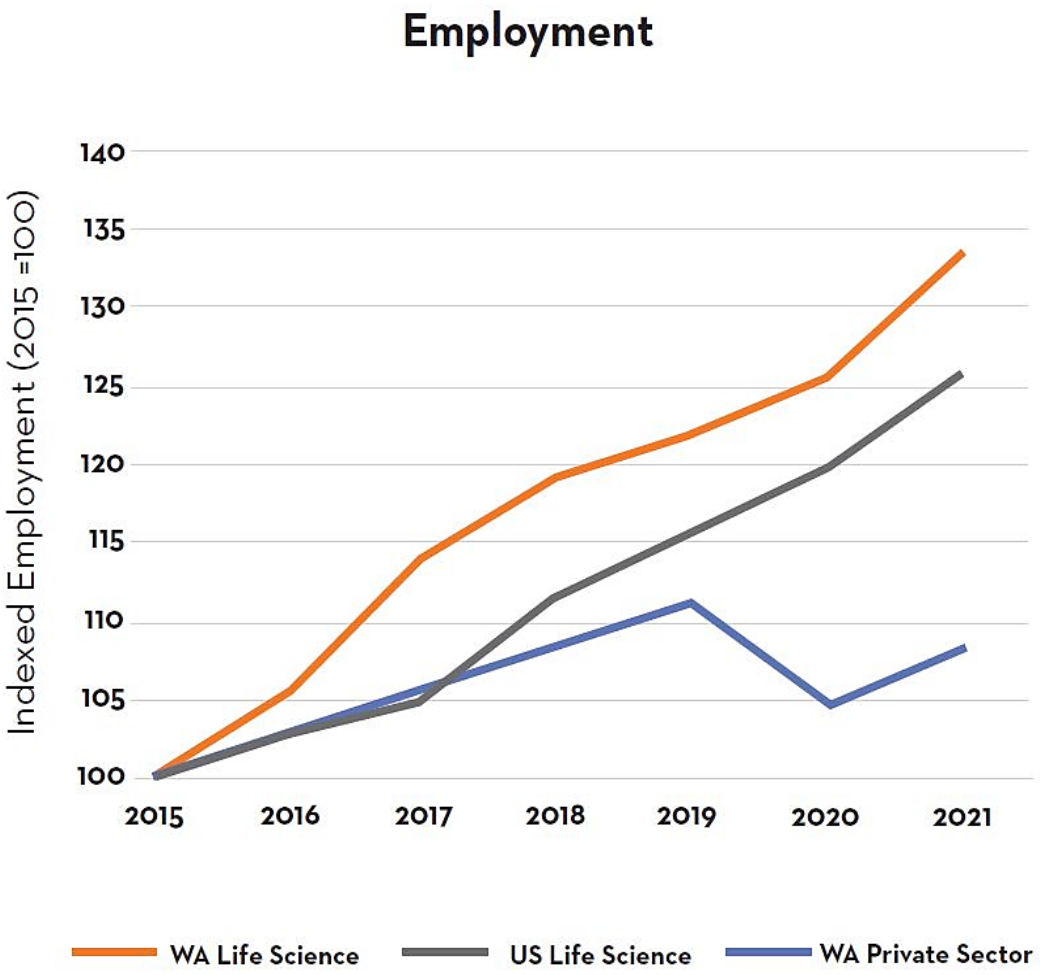
absci®

JUBILANT HOLLISTERSTIER

Umoja BIOPHARMA

Growth has Accelerated Over the Past Decade

Washington is a top 10 life sciences hub in the United States



ADDED MANUFACTURING JOBS

TOP STEM-BASED INDUSTRY FOR WOMEN

GROWTH DRIVEN BY COMBINATION OF INVESTMENT & EXPANSION

2022 EMPLOYMENT

46,540
Individuals employed directly in life sciences jobs

112,851
Jobs supported by WA life sciences industry

2022 ECONOMIC IMPACT

$38.8B
Total economic impact

$1.6B
Contribution to state/local tax revenue

Washington's Life Sciences Industry: Unique Attributes

Cell & Gene Therapy, Immunotherapy/ Oncology

Convergence of Tech (AI) & Life Sciences

World-Class Research Institutions

Global Health

Ultrasound

Advanced Biomanufacturing

Washington has Emerged a Biomanufacturing Hub

Bristol Myers Squibb™

AGC Biologics

Pfizer

JUBILANT HOLLISTERSTIER

Just EVOTEC BIOLOGICS

Inventprise

Selkirk

Sana Biotechnology®

PTx PARTNER THERAPEUTICS

…But its future hangs in the balance

Critical State Investments - Research



Andy Hill CARE Fund

Washington's Cancer Research Endowment

Distributed more than $58M in grants for cancer research to Washington state companies and research institutions

Critical State Investments - Workforce

CAREER CONNECT WASHINGTON

Workforce – Need to expand programs for specialized expertise

We've developed a statewide strategy for building targeted programs with targeted institutions to build capacity

Shoreline Community College

Community Colleges of Spokane

Washington State University Health Sciences Spokane

University of Washington Bothell

In-Demand Life Science Jobs

★ = high volume demand

★ Lab, Research Technicians

2-year STEM degree

★ Quality Control

4-year degree

Bioinformaticians, Data Sciences, & Tech Talent

★ Clinical Research Coordinators

2-year STEM degree + on the job training

Regulatory Affairs

Engineers & Engineering Technicians

★ Clinical Research Associates

2-year STEM degree

★ Biomanufacturing Technicians

High school + certificate

★ Scientists & Senior Scientists

4-year degree

ALTASCIENCES · Bristol Myers Squibb™ · Fred Hutch Cancer Center · Inventprise · JUBILANT HOLLISTERSTIER · Just EVOTEC BIOLOGICS · Sana Biotechnology · University of Washington · Washington State University

Critical State Investments - Entrepreneurship

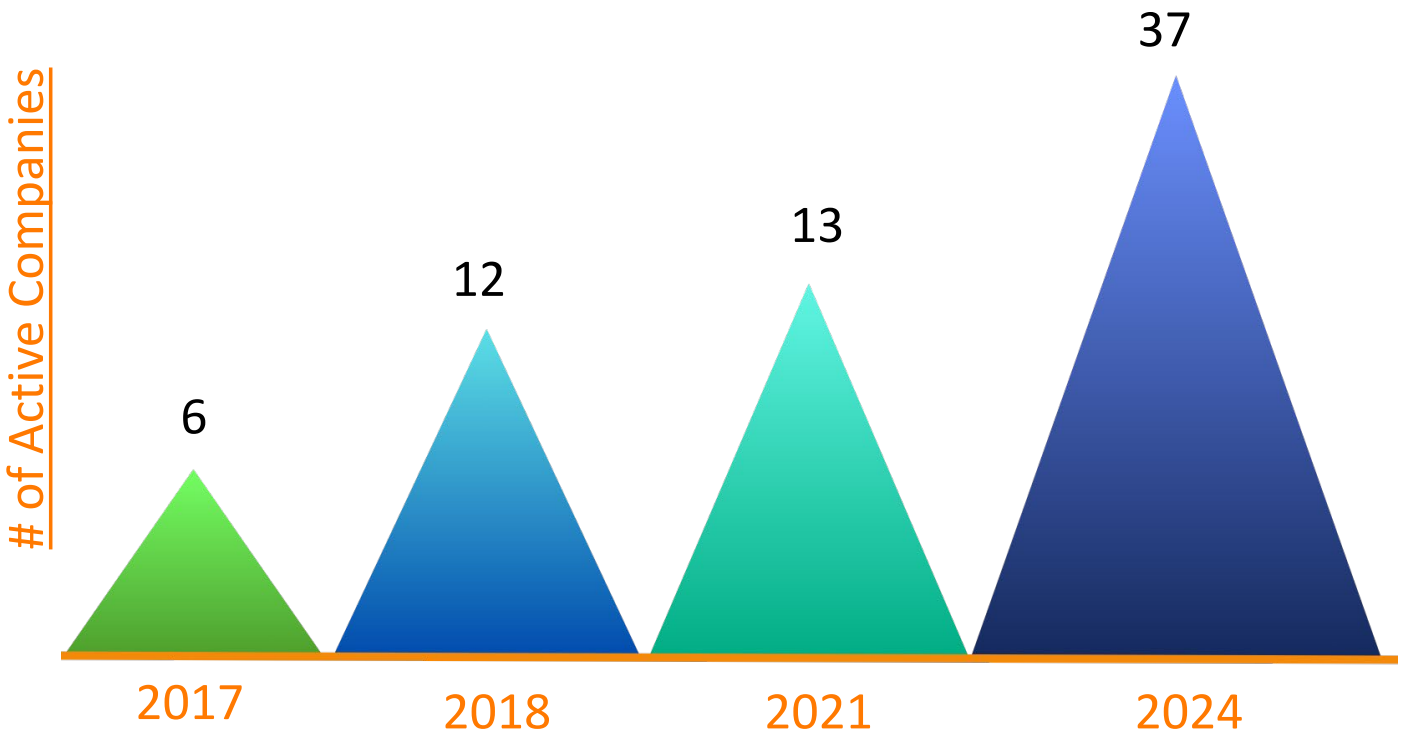
LIFE SCIENCE WASHINGTON INSTITUTE

LSW's Washington Innovation Network (WIN) Mentoring Program is one of the highest impact, highest return economic development programs in the country.

WIN by the Numbers:

- **102** Ventures Since Inception
- **$3.2B** Raised to Date*
- **40%** Located Outside of Seattle
- **43** Total Graduates
- **41%** Are Led or Co-Founded by Women
- **$120M** Grant Funding Received

Program Growth:



What Makes Us Less Competitive Than Other States

State	SBIR State Matching	Manufacturing Sales Tax	R&D Tax Credit	Angel Funding
California		X	X	
Massachusetts	X	X	X	X
New York		X	X	X
Pennsylvania		X	X	X
North Carolina	X	X		
Washington				
Illinois	X	X	X	X
Virigina	X	X	X	X
Maryland	X	X	X	X

The Massachusetts Life Sciences Center (MLSC) has strategically deployed more than $700M since its creation in 2007, through a combination of grants, loans, capital infrastructure investments, tax incentives, and workforce programs.

New York Life Sciences R&D Tax Credit: **50% credit of the federal R&D credit (up to 6% of R&D expenditures)** and a **specialized Life Sciences R&D Credit (15-20% of expenditures)** for qualified businesses. This program is particularly attractive for life sciences startups and growing companies.

The North Carolina Biotechnology Center (NCBiotech) is a state-funded nonprofit that supports life sciences growth through grants, loans, and strategic programs. Since 1984, it has awarded nearly 3,000 grants and loans totaling over $150M to advance research, innovation, and workforce development across North Carolina.

Emerging Global Leadership in Convergence of AI and Life Sciences



Washington state is a global leader in AI innovation in the life sciences.

To sustain progress, we must approach AI in life sciences differently than in consumer tech, recognizing its unique challenges and opportunities.

INSTITUTE FOR Protein Design
UNIVERSITY of WASHINGTON

Adaptive biotechnologies

prevencio
Power of AI to Prevent the Preventable

FUJIFILM
Value from Innovation
SONOSITE

CYRUS BIOTECHNOLOGY

VILYA

absci

Lila BIOLOGICS

ArchonBio

xaira

MOPAC

A-ALPHA BIO

AI2 Allen Institute for AI

MONOD BIO

CYRUS
BIOTECHNOLOGY

Life Sci WA
Overview of AI in Biotech



AI / ML Applications the Pharmaceutical Space

- Health Care is a $4,900 Billion US industry
- Drugs are a $1,600 Billion global industry, 60% small molecules (aspirin, Lipitor), 30% biologics (insulin, Ozempic)

Business Operations

Example applications…

- Process Improvement
- Post-Marketing Surveillance
- Chatbots
- Patient Assistance
- Manufacturing Process Improvement
- Manufacturing Controls

Clinical Applications

Example applications…

- Clinical Trial Operations (site selection, patient recruitment, oversight, etc.)
- Personalized Medicine (high / low responders, stratification, etc.)
- Dose optimization
- Data Management
- Incorporating real world evidence (from practicing physicans)

Research & Development

Example applications…

- Target Identification
- Drug Re-purposing
- Disease prioritization
- Protein structure prediction
- In silico de novo protein design
- In silico Protein Optimization
- In silico mAb Optimization
- In silico small molecule library screening
- In silico small molecule Optimization
- In silico Tox and Efficacy Prediction

Application of AI/ML in Drug Discovery & Development

Established

Emerging

- Big Data analysis – Mining proprietary datasets for new targets, limited value as stand alone without drug development partner
  - Examples: insitro, Pattern Computing, BioMap, PostEra, Seismic Therapeutics,
- Small Molecule Discovery & Design – First successful applications of AI/ML in the pharma space
  - Examples: Atomwise, Excsientia, Recursion, Aria Pharma (twoXAR), BenevolentAI



David Baker, Co-Founder
UW IPD
2024 Nobel Prize in Chemistry



- Biologics Design – at the interface between protein structure prediction and protein redesign
  - Proteins – Recent introduction language model ML has accelerated the design capabilities of this space
    - Example: Cyrus Bio, Xaira, Generate Biomedicine, Profluent, Insumed, Neoleukin
    - Alphafold, **OpenFold (Seattle), Rosettafold (Seattle)**
  - mAb – CDR modeling remains an active area of development, limited computational benefit above other mAb platforms
    - Examples: BigHat Biosciences, Biolojic Design, MAbSilico, AbSci, nABla, Prescient (Genentech)
  - RNA – Not addressed by AI/ML, emerging area for future tool development, design is still physics based
    - Example: Atomic AI, Inceptive, (Das, Stanford)
- Cell Therapies – *Emerging area of applying protein AI/ML to the nascent cell therapy space*
  - Examples: Outpace Bio, BMS

CYRUS BIOTECHNOLOGY

Univ. of Wash / David Baker's lab / Protein Design Institute – Spinout Map

Human Therapeutics & Vaccines

Icosavax
Engineered Nanopartical cages, Founded 2018
Acquired by AstraZeneca for $1.1B

xaira
De novo mini binders, Founded 2023
Raising Seed Round 2024

Mopac
Oral IL23 antagonist, Founded 2022

A-Alpha Bio
Target Screening, Founded 2018

Cyrus Biotechnology
Protein Engineering, Founded 2014

Neoleukin
De novo, Founded 2018
Liquidated 2023

PVP Bio
Protein Engineering, Founded 2017
Acquired by Takeda $317M

INSTITUTE FOR Protein Design
UNIVERSITY of WASHINGTON



Industrial Proteins

Arzeda
Protein Engineering, Founded 2008

Biosensors

Monod
Biosensors, Founded 2022

Scientific Association
- Sana Biotechnology
- Lyell Immunopharma
- Outpace Bio
- Charm

Seattle is the global leader in biotech AI in 2025

- Seattle/WA: Protein design Nobel prize in 2025, 30 years of work
  - IPD, A-Alpha, Icosavax, Xaira, Outpace, Arzeda, Neoleukin, Cyrus, Vilya, Absci
- Boston/MA:
  - Generate, AIproteins; heavier small molecule
- SF/CA:
  - Xaira, BigHat, (others in small molecule e.g. Atomwise)
- London/UK: Nobel prize in 2025 for DeepMind
  - Small molecule (Exscientia, Benevolent, Charm, DeepMind, Isomorphic, Aria (twoXAR))

How can we turn innovation (papers, IP, people) into investment dollars and approved drugs in WA?

- Tailwinds: Competitive business environment, cost of living
- Headwinds: Senior talent in biotech, capital in biotech, favorable regulatory
- Responsible Biodesign international working group https://responsiblebiodesign.ai/

Biotech is a heavily regulated industry with FDA federal, state, local, and institutional frameworks

- **FDA regulates drugs** from pre-clinical work (pre Investigational New Drug application) in rats, monkeys, rabbits, etc. through first in human (ph1), efficacy (ph2) and approval (ph3), and into post-approval studies
- **OSHA and WA State and other permitting agencies** regulate laboratories, chemical matter, and the use of animals pre-clinically
- The outputs of our industry are novel chemical matter and biological matter, which **requires a laboratory** to be put into practice physically
- **Drugs require the full FDA path** before going into humans
- **Existing FDA regulatory** handles human intelligence, and artificial intelligence adds more variety to human ideas but fits into the same framework
- **Biotech AI outputs are fundamentally different** from the widely used **Generative AI** models in the news for text, images, video, and sound (e.g. Gemini, ChatGPT, etc.)
- **Biotech AI outputs are not human readable** –they have to go to a lab to be tested, just like any the invention of a human mind
- Standard Generative AI models are human readable directly (no lab needed) and not currently subject to FDA or other regulatory, **those risks are different from Biotech AI**
- **FDA working groups are evaluating AI risks and rewards** in the context primarily of us in human clinical trials and in clinical decision making