



state bioscience initiatives 2008



Technology, Talent and Capital: California and National Life Sciences 2009

Peter M. Pellerito
Biotechnology Industry Organization
BIO Senior Policy Consultant
Washington, DC

Life Sciences Industry In Review During Uncertain Times

- ✓ National View of Industry Growth
- ✓ Where California Ranks
- ✓ A Look Into the 2009 Crystal Ball

Defining the Life Sciences

The Life Sciences are a diverse group of industries and activities with a common link—they apply knowledge of the way in which plants, animals, and humans function.

The Life Sciences industry sector is defined as including the following four subsectors:

- Agricultural Feedstock & Chemicals
- Drugs & Pharmaceuticals
- Medical Devices & Equipment
- Research, Testing & Medical Laboratories

US Industry Strong and Diversified

Total Jobs and Companies 2007-2008

- ✓ **Life Sciences Companies:** 42,910
- ✓ **Life Sciences Jobs:** 1,295,979

Life Sciences Company Sectors

- ✓ **Drugs & Pharmaceuticals:** 2,654
- ✓ **Medical Devices:** 15,215
- ✓ **Research & Testing:** 22,857
- ✓ **Agricultural Bio & Chem :** 2,183

Source: Battelle 2008

California Biomedical Industry Highlights 2007

- Total biomedical companies: 2,042 (#1)
- Total estimated revenue: \$74.5 billion (#2)
- Total estimated employment: 271,000 (#1)
- Overall biomedical average wages: \$75,000 (#1)
- Total NIH grants awarded: \$3.2 billion (#1)
- Total estimated VC investment: \$4.3 billion (#1)
- Estimated private investment in R&D: \$28.2 billion (#1)

Sources: Battelle, CHI

Growth Prospects of Industry: U.S. and California

- Academic bioscience R&D expenditures totaled \$29 billion in FY 2007 – Academic bioscience R&D grew 37% from FY2002 to FY 2007
- U.S. higher education institutions awarded bioscience-related degrees to more than 143,000 students in the 2007 academic year
- Venture capital investments in bioscience companies reached \$11.6 billion in 2007
- More than 82,000 bioscience-related patents were awarded between 2002 and 2007 in the U.S.

Sources: Battelle, E&Y

All Technology Industries in Trouble or Not?

- ***"By year end, the Burrill Biotech Select Index will have once again outperformed the general markets and the DJIA and NASDAQ."*** Burrill and Company, San Francisco, January 14, 2009
- ***"Investors are optimistic about life sciences stock performance...70% of surveyed companies expect this sector to outperform the rest of the market in 2009."*** Thompson Reuters, February 9, 2009
- ***"Two industry sectors will feel the recession less than other techies...biotech and clean technologies..."*** Dow Jones News Service, January 2009

Industry Building Blocks Got Us Here..and Will in the Future

- NIH Funding
- Degrees Awarded
- Venture Capital
- Patents
- University/Research Centers

NIH Funding: The “Gold Standard” of Biomedical Research Funding, FY 2007

In 2007, NIH invested more than \$21 billion in extramural U.S.-based medical research and education

NIH Funding			
Leading States	Total in \$ Thousands	Leading States	Per Capita
California	\$3,163,252	Massachusetts	\$346.70
Massachusetts	\$2,236,110	District of Columbia	\$332.72
New York	\$1,934,768	Maryland	\$173.81
Pennsylvania	\$1,399,308	Rhode Island	\$135.59
Texas	\$1,083,465	Connecticut	\$133.97
Maryland	\$976,541	Washington	\$121.47
North Carolina	\$931,189	Pennsylvania	\$112.55
Washington	\$785,736	Vermont	\$107.14
Illinois	\$723,581	North Carolina	\$102.77
Ohio	\$628,294	New York	\$100.26

Source: Battelle calculations—based on NIH data and U.S. Census Bureau population estimate.

The industry leaders – California, Massachusetts, New York, Pennsylvania and Texas -- lead in total NIH funding.

Life Sciences Degrees Awarded Academic Year 2007

Both large and small states with significant medical schools are key sources of the future bioscience workforce

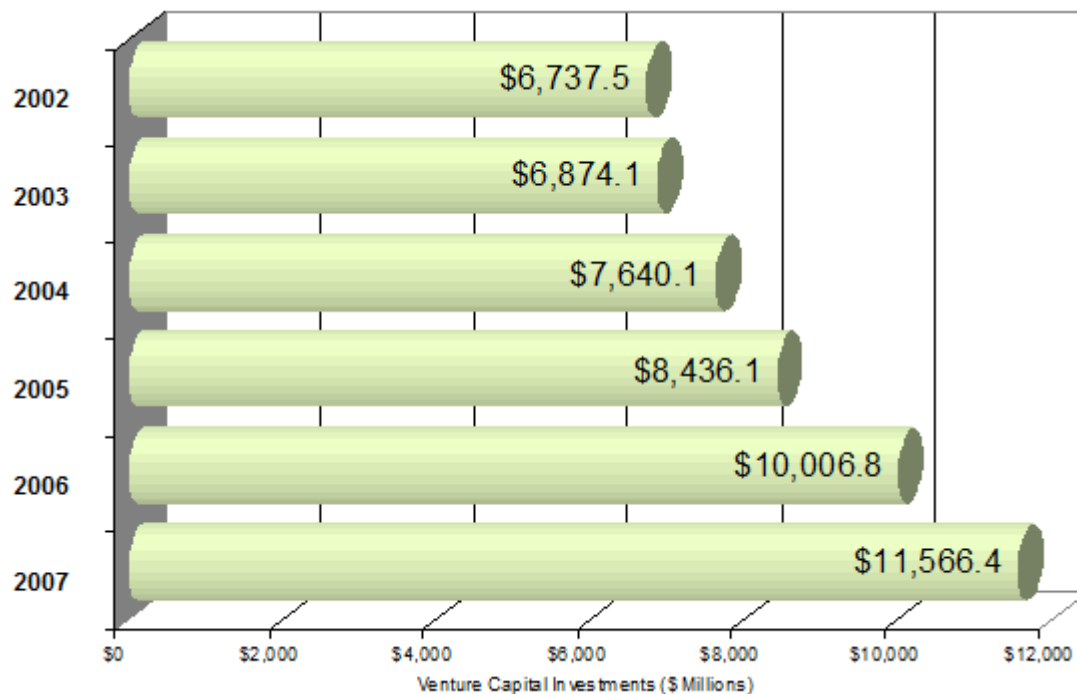
Bioscience Higher Education Degrees			
Leading States	Total Degrees	Leading States	Per 1 M Population
California	17,051	Massachusetts	5,293
Illinois	9,622	District of Columbia	5,005
Texas	9,096	Maryland	3,159
New York	8,510	Rhode Island	3,142
Pennsylvania	7,506	Connecticut	3,057
Florida	5,717	Washington	3,040
Ohio	5,351	Pennsylvania	2,998
Michigan	4,721	Vermont	2,638
Massachusetts	4,321	North Carolina	2,635
North Carolina	4,174	New York	2,573

Source: Battelle calculations—based on NCES IPEDS data and U.S. Census Bureau population estimate.

In 2007, U.S. higher education institutions granted 143,000 bioscience-related degrees – biological bachelor's degrees accounted for 40% of total degrees awarded

U.S. Life Sciences Venture Capital Investments, 2002 - 2007

U.S. bioscience venture capital investments increased steadily from 2002 to 2007, reaching \$11.6 billion in 2007 – surpassing the industry peak of \$11.0 billion set in 2000



Leading States: Life Sciences Patents 2002 -- 2007

Life Sciences-related patents totaled 82,000 from 2002 to 2007..... California equal to Massachusetts, Pennsylvania and New Jersey combined

Bioscience-Related Patents					
Leading States		Total Patents	Leading States		Per 1 M Population
California		24,293	Hawaii		2,310
Massachusetts		9,443	Delaware		1,774
Pennsylvania		8,522	Massachusetts		1,464
New Jersey		6,012	Rhode Island		962
New York		5,139	Minnesota		922
Minnesota		4,790	Connecticut		794
Maryland		3,680	Alabama		707
Florida		3,388	New Jersey		692
Texas		3,301	Pennsylvania		685
Alabama		3,274	California		665

Source: Battelle calculations—based on USPTO/Delphion data and U.S. Census Bureau population estimate.

Six of the top 10 states in total number of patents also lead when controlling for population but a number of smaller states – Hawaii, Delaware, and Rhode Island – are in the top 10 states in bioscience patents per 1 million population

Academic Bioscience R&D, FY 2007

California leads in total academic bioscience R&D with \$4 billion in Life Sciences R&D

Academic Bioscience R&D			
Leading States	Total in \$ Thousands	Leading States	Per Capita
California	\$4,008,809	District of Columbia	\$306.82
New York	\$2,528,232	Maryland	\$234.50
Texas	\$2,217,069	Massachusetts	\$174.02
Pennsylvania	\$1,478,008	Vermont	\$172.59
Maryland	\$1,313,685	Connecticut	\$161.29
North Carolina	\$1,310,490	North Carolina	\$147.75
Illinois	\$1,127,038	Nebraska	\$141.46
Massachusetts	\$1,119,740	New York	\$131.12
Ohio	\$1,048,200	Iowa	\$130.43
Florida	\$560,576	Missouri	\$127.08

Source: Battelle calculations—based on NSF data and U.S. Census Bureau population estimate.

States with large academic infrastructures lead in total academic bioscience R&D but on a per capita basis other states emerge as research leaders, particularly those with strong agricultural R&D capacities

California Update

- Between 2003 and 2007, the state industry added approximately 23,000 jobs and grew at an annual average rate of 1.76%
- The biomedical sector employs significantly more people than aerospace and motion pictures combined in California.
- California companies have almost 900 products in the pipeline, 452 of which are being evaluated in clinical trials.
- About one third (32%) of the products in California pipeline target cancer.

Key State Life Sciences Initiatives

- Addressing talent needs
 - Offering new bioscience-related programs and degrees at all education levels
 - Instituting programs that combine business and Life Sciences
 - Developing bioscience career pathways
 - Conducting inventories of bioscience workforce needs
- Becoming more active in supporting the application of the Life Sciences to agriculture, energy and industrial products
 - Twenty-three states reported making investments in bioenergy research and research facilities
- Changing tax and regulatory policies to address the needs of bioscience companies
 - 36 states offer R&D tax credits
 - 31 states exempt R&D equipment, including for biomanufacturing from sales taxes

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Prospects for Growth in California

- 53% expect to increase workforce in next two years
- 51% expanded in-state R&D capacity in 2007-2008; 35% expect to expand R&D activities
- 41% expect to increase California manufacturing workforce within next two years;
- 49% plan to expand in-state manufacturing activities

Source: California Health Care Institute 2009

Conclusions

- The bioscience sector is a stable driver of your Southern California economy with clusters of bioscience firms focused on specialized niches
- State and regions are becoming increasingly sophisticated in their understanding of the industry and are implementing policies and programs to support its growth
- A challenge for state and federal policymakers will be to continue to invest in light of decreased federal funding and fiscal pressures facing state governments as the U.S. economy weakens
- But investing in the Life Sciences will result in significant benefits
 - Better healthcare for citizens
 - Good well-paying jobs that will create economic opportunities and an improved quality of life



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California leads in total academic bioscience R&D but the District of Columbia and Maryland lead on a per capita basis

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Source: Battelle calculations—based on NIH data and U.S. Census Bureau population estimate.

While the large states – California, Massachusetts, New York, Pennsylvania and Texas -- lead in total NIH funding, on a per capital basis, many smaller states such as Rhode Island, Connecticut and Vermont achieve a significant level of funding

Regional Bioscience Occupational Employment, FY 2006

California accounts for more than twice the bioscience occupational employment than the next highest state – Pennsylvania – suggesting that occupational employment is tied to population size

Bioscience Occupational Employment				
Leading States		Total Occ. Employment	Leading States	
			Per 1 M Population	
California	69,600	District of Columbia	5,295	
Pennsylvania	34,780	Massachusetts	4,784	
New York	34,520	Maryland	3,258	
Texas	34,170	North Dakota	2,824	
Massachusetts	30,780	Pennsylvania	2,804	
Illinois	23,757	Connecticut	2,683	
Florida	21,870	Minnesota	2,625	
New Jersey	18,580	Washington	2,615	
North Carolina	18,510	Nebraska	2,512	
Ohio	18,460	Utah	2,466	

Source: Battelle calculations—based on BLS data and U.S. Census Bureau population estimate.

Of the 588,520 workers employed in bioscience occupations, more than half are employed as medical and clinical laboratory technicians; 35% are employed as biological scientists and technicians

Bioscience Degrees Awarded, Academic Year 2006

Both large and small states with significant medical schools are key sources of the future bioscience workforce

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State Bioscience Venture Capital Investment, 2002 -- 2007

California dominates among the states – accounting for more than 40% of all bioscience venture capital invested from 2002 through 2007

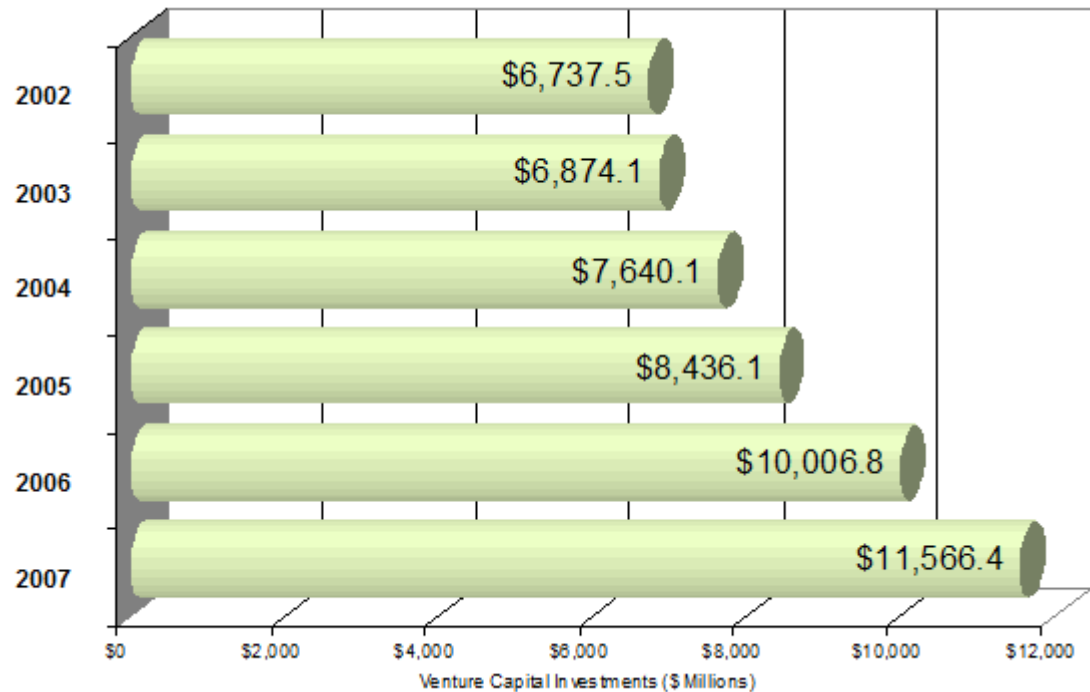
Bioscience Venture Capital Investment			
Leading States	Total in \$ Millions	Leading States	\$ Per 1 M Population
California	\$20,743	Massachusetts	\$1,099
Massachusetts	\$7,091	California	\$567
New Jersey	\$2,778	Maryland	\$348
Pennsylvania	\$2,772	District of Columbia	\$337
Maryland	\$1,957	New Jersey	\$320
Washington	\$1,833	Minnesota	\$284
North Carolina	\$1,527	Washington	\$283
Minnesota	\$1,474	Rhode Island	\$277
Texas	\$1,338	Pennsylvania	\$223
New York	\$1,225	Colorado	\$209

Source: Battelle calculations—based on Thomson Reuters VentureXpert data and U.S. Census Bureau population estimate.

On a per capita basis, Massachusetts exceeds California by more than \$500 per 1 million population

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Top 5 States – Bioscience Venture Capital Investments by Segment, 2002 -- 2007

State	Biosensors	Biotech						Med/Health			Medical Diagnostics	Medical Therapeutics	Pharmaceutical
		Animal	Equipment	Human	Industrial	Other	Research	IT/Software	Products	Services			
CA	*	*	*	*	*	*	*	*	*	*	*	*	*
CO					*				*				
FL									*				
IL						*							
MD	*	*			*			*					*
MA	*		*	*	*	*	*	*	*		*	*	*
MN			*						*			*	
MO		*											
NJ				*	*					*			*
NM	*												
NY			*								*		
NC		*		*			*						
PA			*				*	*	*		*	*	*
RI						*	*						
TN								*		*			
TX										*			
WA	*	*		*							*	*	

Source: Battelle calculations—based on Thomson Reuters VentureXpert data..

Leading States: Bioscience Patents, 2002 -- 2007

Bioscience-related patents totaled 82,000 from 2002 to 2007 but the numbers have trended downward during this time period

Bioscience-Related Patents				
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			Per 1 M Population	
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Massachusetts		9,443	Delaware	1,774
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Six of the top 10 states in total number of patents also lead when controlling for population but a number of smaller states – Hawaii, Delaware, and Rhode Island – are in the top 10 states in bioscience patents per 1 million population

Top 5 States – Bioscience-Related Patents by Class Group, 2002 - 2007

State	Agricultural Bioscience	Biochemistry	Biotechnology	Drugs and Pharmaceuticals	Surgical and Medical Instruments	Other Medical Devices and Equipment	Other Bioscience-Related
CA							
FL							
GA							
HI							
IL							
IA							
MD							
MA							
MN							
MO							
NJ							
NY							
OR							
PA							

Source: Battelle calculations—based on USPTO/Delphion data.

Factors for Success: Building a State and Regional Bioscience Economy

Ingredients for building a critical mass in the Life Sciences in states and regions include:

- Engaged universities with active leadership
- Building entrepreneurial cultures with intensive networking across sectors and with industry
- Available capital covering all stages of business cycle
- Discretionary federal or other R&D funding
- Workforce and talent pool
- Access to specialized facilities and equipment
- Supportive business, tax and regulatory policies
- Patience and a long-term perspective

Key Findings: State Bioscience Initiatives (continued)

States with Legislative Caucuses

Florida

Georgia

Iowa

Kansas

Maryland

Massachusetts

Michigan

Minnesota

Missouri

Ohio

Pennsylvania

Virginia

States are:

- Establishing legislative caucuses and committees focused on the Life Sciences
- Advancing bold initiatives in the Life Sciences, including investments in stem cell research
 - Nine states have pledged to spend more than \$4 billion on stem cell research over the next 10 years
- Reassessing bioscience investments in light of budget realities
- Continuing to address risk capital gaps
 - Thirty-three states reported programs that provide pre-seed and seed stage investments in bioscience companies
- Creating new commercialization vehicles
- Funding translational research in the context of existing programs.

State Bioscience Programs

Programs	Number of States*
Developing and Commercializing Bioscience Discoveries	
Funding for Bioscience R&D	30
Funding for Stem Cell Research	9
Bioenergy Investments	23
Funding for Bioscience R&D Facilities and Equipment	29
Faculty Development Programs	19
Support for University-Industry Partnerships	29
Supporting Bioscience Companies	
Bioscience Entrepreneurial Support Programs	11
Pre-commercialization/Proof of Concept Funding	33
Pre-Seed Funds	26
Dedicated Bioscience Facilities Financing Programs	3

* Out of total of 45 (44 states and Puerto Rico) that responded to the survey.

Conclusions

- The bioscience sector is a growing driver of our economy with clusters of bioscience firms focused on specialized niches found in many states and regions
- State and regions are becoming increasingly sophisticated in their understanding of the industry and are implementing policies and programs to support its growth
- A challenge for state policymakers will be to continue to invest in light of decreased federal funding and fiscal pressures facing state governments as the U.S. economy weakens
- But investing in the Life Sciences will result in significant benefits
 - Better healthcare for citizens
 - Alternative fuels that can decrease U.S. dependence on oil and improve environmental quality
 - Good well-paying jobs that will create economic opportunities and an improved quality of life

Bioscience employment increased 5.7% between 2001 and 2006 as compared to 3.1% job growth in the overall national private sector

Contact Information

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ppeller@mac.com
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