



The Economic Impact of the Biotechnology and Pharmaceutical Industries in New York

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- In 2003, U.S. biotechnology companies employed approximately 200,000 people and generated \$39.2 billion in revenues.
- In its 2003-2004 annual report, the New York Biotechnology Association reported that 101 biotech companies were located in New York in 2002.
- In 2003, New York's biotech and pharmaceutical industries employed 54,469 people who earned \$3.3 billion in wages.
- These companies generated \$18.1 billion in economic activity in New York in 2003.
- New York's research institutions and biotech companies generated 486 biotech patents in 2004. New York has historically ranked among the top five states for biotech patents.
- Over the past three years, New York has ranked second in the nation in the number of federal scientific grants it received and third in the nation for NIH funding and grants. In 2004, New York institutions received 5,192 NIH grants totaling \$1.9 billion—a 10 percent increase from 2003.
- In 2004, approximately \$3.8 billion of venture capital funding was invested in biotech companies—18.3 percent of total venture capital investments.
- The federal government projects that biotech and pharmaceutical industry employment will grow nationally by 12.5 percent by 2012, creating 7,000 new jobs in New York—including 5,000 manufacturing jobs.
- We estimate that this increase could support a total of 15,000 new jobs in New York.

Biotechnology is an important component of the New York State economy, and could take on an increasingly significant role as the industry continues to develop. In supporting the expansion of biotechnology, New York has the potential to create new high-wage jobs, generate additional tax revenue, and boost the upstate economy.

As New York attempts to expand its biotech industry, it faces strong competition from other states, including, but not limited to, California, Connecticut, New Jersey, and Pennsylvania. These states are attempting to capitalize on the economic benefits associated with biotechnology by investing in resources to support the industry. Many of these efforts specifically target stem cell research, which has become more reliant on state and private funding as a result of strict limits placed on federal funds used for this research.

The economic impact of biotechnology as a distinct industry is currently difficult to evaluate because of the manner in which data is collected; however, it is possible to calculate the combined impact of the biotech and pharmaceutical industries.

In 2003, New York's biotech and pharmaceutical industries employed 54,469 people and paid \$3.3 billion in wages. On average, each job within these industries creates one additional job outside these sectors. Thus, in 2003, these industries supported approximately 110,000 jobs in New York and \$18.1 billion of economic activity.

Enabling these sectors to keep pace with national growth projections could create 7,000 new pharmaceutical and biotech jobs and a total of 15,000 new jobs in New York by 2012.

New York's biotech industry is supported by world-class academic institutions, large amounts of federal scientific funding, targeted State and local economic development programs, and venture capital funding. If New York is to remain

a center of biotech activity and continue to be competitive with other states, however, efforts must be increased to support this industry.

Background

Biotechnology is defined as “the use of the cellular and molecular processes to solve problems or make products.”¹ It is used in industries that range from agriculture (e.g., genetically engineered crops) to crime prevention (e.g., DNA fingerprinting). The general public is most familiar with biotech’s medical applications.

Scientists believe that biotechnology, particularly stem cell research, could contribute to the discovery of cures for a variety of diseases, including Alzheimer’s, cancer, heart disease, juvenile diabetes, Multiple Sclerosis, and Parkinson’s.

In 2003, U.S. biotech companies employed approximately 200,000 people and generated \$39.2 billion in revenues.² Many states have recognized the economic potential of biotech and are committed to benefiting from its expansion.

Voters in California recently approved a referendum to spend \$3 billion in state funding over ten years to create the California Institute for Regenerative Medicine, eclipsing efforts by other states (including New York) to attract elements of the biotech industry and stem cell research. New Jersey has announced plans to invest \$380 million in the Stem Cell Institute of New Jersey. Connecticut has also dedicated approximately \$20 million in budget surpluses to stem cell research, and substantial state and private investments have been proposed in Illinois, Indiana, Massachusetts, and Pennsylvania. These programs have escalated an ongoing bidding war between states to attract and retain biotech companies and stem cell researchers.

¹ Ernst & Young, “The Economic Contributions of the Biotechnology Industry to the U.S. Economy,” <http://www.bio.org/speeches/pubs/ernstyoung.pdf> (accessed January 26, 2005).

² Michael Hildreth, *Resilience: Americas Biotechnology Report 2003*, Ernst & Young, July 2003, http://www.ey.com/GLOBAL/content.nsf/US/Health_Sciences_Library_-_Resilience:_Americas_Biotechnology_Report_2003 (accessed January 26, 2005). Hereafter referred to as Hildreth.

In order to develop a strong and vibrant biotech industry, New York must build on its existing programs. The State Assembly has twice passed a bill that would ensure that socially responsible therapeutic cloning and stem cell research can occur in New York, and is expected to introduce a bill this year that would include State funding for stem cell research. Legislation was also recently introduced in the State Senate to create a \$1 billion fund for stem cell research that would distribute State loans and grants to researchers and companies in New York.

Biotechnology in New York

New York is one of the country’s centers for biotechnology. It ranks among the top five states in the biotech industry for federal scientific grants, biotech patents, and employment, and ranks sixth in the number of biotech companies. New York’s biotech industry is supported by the state’s strong pharmaceutical industry, its world-class academic and research institutions, a proven record of winning federal research grants, the proximity to Wall Street and venture capital firms, and targeted government programs.

Though biotechnology has expanded in New York, future growth may be stymied by a lack of affordable space and competitive programs in other states. To combat this, 10 incubators and science parks have been built throughout the state to offer biotech companies affordable space. An additional 11 incubators are in development.

In its 2003-2004 annual report, the New York Biotechnology Association (NYBA) reported that 101 biotech companies were located in New York in 2002. According to a NYBA survey, these companies brought in revenues of \$1.6 billion and employed 6,430 people.³

Within the North American Industry Classification System (NAICS), most jobs related to biotech fall under the five-digit classification codes for Research and Development in the Physical, Engineering, and Life Sciences (54171) and Pharmaceutical and Medicine Manufacturing (32541). These codes also include segments of the

³ L.E.K. Consulting and the New York Biotechnology Association, “2003-2004 State of the Industry Report,” <http://www.nyba.org/pdf/04IndustryReport.pdf> (accessed January 26, 2005). Hereafter referred to as NYBA Industry Report.

pharmaceutical industry, however. Department of Labor (DOL) employment figures offer a broad view of the combined industries. In 2003, the biotech and pharmaceutical industries employed 54,469 people in New York.

Employing a well-established economic model,⁴ we estimated the impact that growth in the biotech and pharmaceutical industries had on other sectors of the State economy. Employment in New York’s biotech and pharmaceutical industries grew by 3.6 percent between 2000 and 2003, adding almost 2,000 jobs despite a national recession.

According to the model, job growth in these industries (or, the “direct impact”) also generates indirect and induced effects. The indirect effects reflect the purchase of goods and services by biotech and pharmaceutical firms from other New York companies. The income earned by these new job holders leads to consumption spending, which causes other businesses to grow and hire new workers (the “induced effect”). According to the model, industry growth between 2000 and 2003 supported a total of over 4,100 additional new jobs in the State. Thus, each biotech and pharmaceutical job in New York supports an additional job somewhere in the State.

Table 1
Total Impact of Biotechnology and Pharmaceutical Industries in New York
(\$ in millions)

	Direct	Total
Employment	54,469	109,532
Wages	\$3,268	\$5,940
State Income Taxes	\$178	\$327

Source: OSDC analysis, IMPLAN model

Applying an incremental relationship to overall employment figures within the biotech and pharmaceutical industries would indicate that the indirect and induced effects of these industries supported 55,000 additional jobs in other sectors throughout the State; creating a total of 110,000 jobs in 2003 (see Table 1).⁵

Based on economic relationships in 2001, we estimated that these activities generated

⁴ The IMPLAN model, developed for the federal government, utilizes detailed data on national and local interindustry economic transactions to model the effects of regional economic changes.

⁵ The employment multiplier, defined as total impact divided by direct effects, equals 2.01 for the biotech and pharmaceutical industries.

\$18.1 billion in economic output in New York in 2003.

Employment Trends

In 2003, of the 54,469 people employed within these sectors, 33,210 were engaged in research and development and 21,259 were engaged in medicine manufacturing. Between 2001 and 2003, medicine manufacturing jobs in these industries grew by 5 percent in New York while research and development employment increased by 3 percent.

Biotech and pharmaceutical jobs tend to pay high wages—an average of \$60,003 in 2003—well above the State’s average salary of \$47,265.

Clusters

Biotechnology in New York is concentrated in the downstate region. In 2002, two thirds of the State’s biotech firms were located in New York City, Long Island, or Westchester, and one third were located in the City alone.⁶ Buffalo, Rochester, and the Capital Region, however, remain important centers for biotech companies.

While the majority of biotech companies are located in New York City, firms outside of New York tend to be larger than those in the City. According to the NYBA report, City firms had an average of 40 employees, while Albany-based firms averaged 167 employees, Lower Hudson Valley firms averaged 106 employees, and Long Island companies averaged 70 employees. This trend could be caused in part by the lack of affordable space in New York, which forces companies to move out of the City to expand.

Biotech companies tend to locate near each other and centers of academic and/or scientific research. New York City is home to some of the premier scientific research institutions in the world, including Columbia University, Memorial Sloan-Kettering Cancer Center, New York University, Rockefeller University, and Weill Medical College of Cornell University.

Albany, Buffalo, and Rochester also have a number of important academic centers, notably the Albany Medical Center at the University of Albany, the Center for Advanced Biomedical and Bioengineering Technologies at the University of Buffalo, and the Biomedical Research Center at

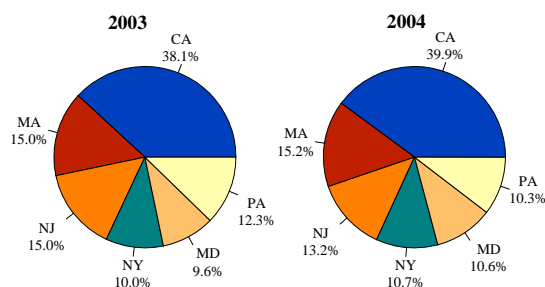
⁶ NYBA Industry Report.

the University of Rochester. Efforts to expand biotechnology outside of New York City should be focused around these and other upstate academic institutions.

Patents

New York’s research institutions and biotech companies generated 486 biotech patents in 2004, the fourth highest in the nation.⁷ While the number of biotech patents registered by New York inventors has declined since 2000, when 651 biotech patents were registered, this matches a nationwide decline in patents.⁸ New York has historically been one of the top states for biotech patents, ranking within the top five states over the past six years (see Graph 1).

**Graph 1
Distribution of Biotech-related Patents in Top States**



Sources: U.S. Patent Office; OSDC analysis

In 2003, approximately 184 biotech patents were registered in New York City, representing over one third of the total patents registered in the State.⁹ Other research centers such as Albany and Rochester received notable amounts of patents, although significantly less than New York City.

Federal Funding

New York has ranked second in the nation—trailing only California—in the number of federal scientific grants it received over the past five

years. In recent years, Massachusetts has closed in on New York, shrinking the difference from 576 grants in 2000 to 57 grants in 2004.

A large majority of federal scientific grants are awarded by the National Institutes of Health (NIH). In 2004, New York received 5,192 NIH grants, totaling \$1.9 billion—a 10 percent increase from 2003.¹⁰ For the past three years, the State has ranked third in the nation both for NIH funding and the number of grants it receives.

New York had six of the top 100 NIH grant-receiving cities in the country in 2003: New York (ranked number 2), Rochester (36), Buffalo (53), Stony Brook (62), Ithaca (67), and Albany (81). In 2001 and 2002, Valhalla and Cold Spring Harbor were also on NIH’s top 100 list, although they did not make the list in 2003.

In 2003, New York City was awarded 2,989 grants totaling \$1.3 billion, almost three times the amounts received by Rochester, Buffalo, Stony Brook, Ithaca, and Albany combined, reflecting the industry clustering that has occurred in the downstate region.

Between 2000 and 2004, the number of grants awarded to New York institutions by the National Institute for Biomedical Imaging and Bioengineering, a member of the NIH, increased by 75 percent, growing at a higher rate than in California (66.4 percent) or Massachusetts (70 percent). During the same period, New York also received an increased amount of grants from the National Institute for Human Genome Research, despite a 13.9 percent drop in the number of grants awarded by the institute.

Venture Capital Funding

New York has historically had good access to capital. In 2004, \$20.9 billion in overall venture capital funds were invested in the United States. Though California attracted more venture capital investments than other states that year—more than 40 percent of total investments—the New York metropolitan area received \$1.45 billion and

⁷ Most biotech patents fall into four classifications developed by the U.S. Patent Office: Drug, Bio-Affecting and Body-Treating Compositions (424); Chemistry: Molecular Biology and Microbiology (435); Drug, Bio-Affecting and Body-Treating Compositions (514); and Multicellular Living Organisms and Unmodified Parts Thereof and Related Processes (800).

⁸ U.S. Patent and Trademark Office database, <http://patft.uspto.gov/netahtml/search-adv.htm>; and OSDC analysis. Hereafter referred to as USPTO database.

⁹ Ibid.

¹⁰ NIH website, <http://grants1.nih.gov/grants/award/state/state.htm> (accessed January 26, 2005).

trailed only the Silicon Valley and New England regions in total venture capital investments.¹¹

Upstate New York attracted \$116 million in investments, ranking the area 15th in the country for venture capital investments. In total, the State received \$1.6 billion in investments from 226 venture capital deals, which represents 7.5 percent of total investments and 8 percent of the venture capital deals made in the nation last year.

State Resources

New York has invested considerable resources to support the biotech industry. In 1999, the State Legislature passed the Jobs 2000 Act (J2K), which created a multi-year, \$500 million fund to promote the commercialization of laboratory discoveries.

Two years later, the Legislature created the Gen*NY*sis Program to support the State's emerging biotech industry. This program, which uses State-funded debt, allocated \$500 million to be spent over the course of five years to provide financial support for research; create opportunities for collaboration between universities, research centers, and biotech companies; and fund shared lab space and bioscience parks.

The Gen*NY*sis fund includes \$75 million for the Life Sciences Business Development Program, which offers targeted tax breaks and provides grants and loans to biotech companies as they go through the process of testing their product and seeking federal approval. It also provides funding for the renovation or construction of facilities and equipment, and for worker training programs.

In addition to State efforts, many local governments, including the City of New York, have created programs to support the industry. New York City recently announced the creation of a biotech incubator in Harlem. A number of nonprofit organizations, most notably the New York Biotechnology Association and the AMDeC Foundation, are also working to support the State's biotech industry. AMDeC, with generous support from the State and the Starr Foundation, has

created state-of-the-art genomics research cores to help advance statewide biomedical research.

Perhaps New York's greatest resource, however, is its wealth of academic and research institutions. New York State is home to 32 academic research centers dedicated to life sciences. The New York City metropolitan area (which includes parts of northern New Jersey) has 46 medical schools and major research facilities and 64 hospitals and medical centers.¹² Academic institutions in Albany, Buffalo, Rochester, and other upstate locales are also essential components of New York's biotech infrastructure.

Through the New York State Center for Advanced Technology program, millions of dollars have been invested in research and development facilities throughout New York State.

State funding was provided to eight academic institutions in New York City—Albert Einstein College of Medicine, City University of New York, Columbia University, Memorial Sloan-Kettering Cancer Center, Mount Sinai School of Medicine, New York University, Rockefeller University, and Weill Medical College of Cornell University—to establish the New York Structural Biology Center. This center will allow scientists to work collaboratively to create new data that will aid in the development of new drugs.

Future Projections

Encouraging growth of the State's biotech and pharmaceutical industries could yield significant economic benefits. If New York's industries meet current federal growth projections, the State would gain over 7,000 new biotech and pharmaceutical jobs by 2012.¹³

Assuming that the multiplier relationship does not change over the next seven years, this would support more than 15,000 new jobs in New York by 2012 (see Table 2).

¹¹ PriceWaterhouseCoopers, Thomas Venture Economics, National Venture Capital Association, "MoneyTree Survey," <http://www.pwcmoneytree.com/moneytree/index.jsp> (accessed January 27, 2005). Hereafter referred to as MoneyTree Survey.

¹² Brookings Institution, "Profile of Biomedical Research and Biotechnology Commercialization," <http://www.brookings.edu/es/urban/publications/biotechnewyork.pdf> (accessed January 26, 2005).

¹³ The DOL projects that the four-digit NAICS sectors that contain Research and Development in the Physical, Engineering, and Life Sciences and Pharmaceutical and Medicine Manufacturing will grow by 12.5 percent between 2002 and 2012.

Table 2
**Projected Impact of Biotechnology and
 Pharmaceutical Industry Growth 2003-2012**

(\$ in millions)		
	Direct Growth	Total Impact
Employment	7,164	15,050
Wages	\$598 ¹⁴	NA

Source: OSDC analysis, IMPLAN model

New York has lost 136,000 manufacturing jobs between 2000 and 2003. The biotech and pharmaceutical industries could add thousands of manufacturing jobs to the State's economy. Communities such as Albany, Buffalo, and Rochester, which were particularly affected by the State's decline in manufacturing employment, are well-suited for biotech. The Bureau of Labor Statistics projects that medicine and pharmaceutical manufacturing jobs will increase by 23.3 percent by 2012, almost 4 times the growth rate of research and development jobs. This would generate 5,000 new manufacturing jobs in New York.

An increase of 7,000 biotech and pharmaceutical jobs in New York would boost State income tax revenues from these industries to \$307 million.

Industry Overview

The Biotechnology Information Organization (BIO) estimates that there were 1,473 biotech companies employing 198,300 people in the United States in 2003.¹⁵ According to BIO, U.S. biotech revenues have grown by 48.4 percent since 1999 and sales have increased from \$7.7 billion in 1994 to \$28.4 billion in 2003.¹⁶

According to federal statistics, 759,255 people were engaged in biotech and pharmaceutical activities in the United States in 2003, which was a 2.2 percent increase from 2001. Employees in these industries earned \$58.5 billion in wages that year. Nationally, biotech and pharmaceutical companies generated \$168.6 billion of direct economic activity in 2003.

Using a national multiplier, these activities supported more than 2.8 million jobs and \$418.3 billion of economic activity.

Employment Trends

Biotechnology is a research-driven industry, and companies often spend ten or more years researching a drug or procedure before it can become commercially viable. In 2003, 61 percent of the jobs in biotech and pharmaceutical industries were in research and development. The remaining jobs were related to pharmaceutical and medicine manufacturing.

Wages for biotech and pharmaceutical jobs are relatively high. In 2003, research and development jobs paid an average of \$76,537, while medicine and pharmaceutical manufacturing paid an average of \$78,036.¹⁷ By 2003, overall industry wages increased 7 percent from 2001.

Clusters

In a 2002 report entitled *Signs of Life: The Growth of Biotechnology Centers in the U.S.*, the Brookings Institution examined the country's 51 largest metropolitan statistical areas (MSAs) and found that the biotech industry was concentrated around nine cities—Boston, Los Angeles, New York, Philadelphia, Raleigh-Durham, San Diego, San Francisco, Seattle, and Washington/Baltimore. Three fourths of the biotech firms formed in the past decade are located in these nine MSAs.¹⁸

On the state level, the U.S. biotech industry is clustered primarily in California and Massachusetts. According to BIO, in 2002 California and Massachusetts had 436 and 200 biotech companies respectively. Maryland, New Jersey, New York, North Carolina, and Pennsylvania also had a relatively large number of biotech companies, although all five states combined had fewer companies than California (see Graph 2).¹⁹ The NYBA lists 101 biotech

¹⁴ Assumes an annual wage growth of 0.7 percent above the projected rate of inflation.

¹⁵ Hildreth.

¹⁶ Biotechnology Industry Organization, "Biotechnology Industry Facts," <http://www.bio.org/speeches/pubs/er/statistics.asp> (accessed December 28, 2004).

¹⁷ U.S. Department of Labor.

¹⁸ Joseph Cortright and Heike Mayer, "Signs of Life: The Growth of Biotechnology Centers in the U.S.," Brookings Institution, <http://www.brookings.edu/es/urban/publications/biotech.htm> (accessed January 26, 2005).

¹⁹ Hildreth.

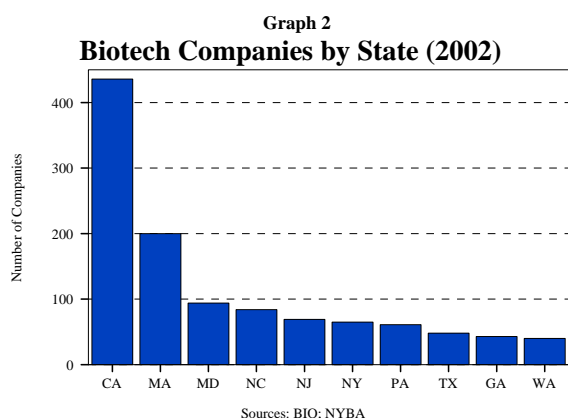
companies in New York in 2002, while BIO's data lists 86 companies in the State that year.²⁰

U.S.	759,255
California	125,553
New Jersey	64,835
New York	54,469
Penn.	46,792
Mass.	39,305

Source: DOL website

California's high number of biotech firms gave it the largest share of biotech and pharmaceutical jobs in 2003, accounting for 16.5 percent of all pharmaceutical and biotech jobs in the country. California

was followed by New Jersey, New York, Pennsylvania, and Massachusetts (see Table 3).



Patents

In 2004, California received the most biotech patents (1,806) in the United States, followed by Massachusetts (689), New Jersey (595), New York (486), Maryland (480), and Pennsylvania (468).²¹ These six states have historically led the nation in biotech discoveries.

Federal Funding

The development of biotech products requires significant amounts of research and time, and companies often require large amounts of capital before they can become self-sufficient from product revenues. The biotech industry has therefore been reliant on federal funding to support ongoing research and development. Over the past ten years, funding for grants from the NIH

has increased from \$8.5 billion in 1994 to \$21.7 billion in 2004.²²

The distribution of funding for scientific research corresponds to the clustering that has occurred in the biotech industry. California remains the leader in overall NIH funding (it received \$3.3 billion in NIH grants in 2003), followed by Massachusetts, New York, Pennsylvania, and Maryland. New Jersey, which remains competitive with other states as a potential hub for biotech, is not one of the top ten grant-receiving states; it ranked 22nd in NIH funding in 2003 and 24th in 2002.²³

Venture Capital Funding

According to the MoneyTree Survey, a quarterly study of venture capital investment activity in the United States, \$3.8 billion of venture capital investments—approximately 18.3 percent—went into biotech companies in 2004.

Historically, California has led the nation in overall venture capital activity. In 2004, California received an overwhelming percentage of the nation's venture capital investments—45 percent of the funding and 39 percent of the deals. Most of this activity was centered in Silicon Valley, which attracted \$7.1 billion in venture capital funding. New England was also a focus for venture capital, receiving \$3 billion in investments last year.

Other centers of venture capital activity in 2004 included the New York metropolitan area (\$1.45 billion), the Southeast region of the United States (\$1.32 billion), San Diego (\$1.2 billion), and Texas (\$1.09 billion). In the past five years, Texas and San Diego have seen a dramatic increase in venture capital investments while Los Angeles/Orange County and the Midwest region have witnessed a decline.²⁴

Stem Cells

Since the mapping of the human genome was completed in 2001, stem cell research has taken on increasing prominence and importance. As the

²⁰ NYBA Industry Report.

²¹ USPTO database. Analysis compiled by OSDC.

²² NIH website, <http://grants1.nih.gov/grants/award/trends/fund9303.htm> (accessed January 26, 2005).

²³ NIH website, <http://grants1.nih.gov/grants/award/state/state03.htm> (accessed January 26, 2005).

²⁴ MoneyTree Survey.

applications for stem cell research expand and new discoveries are made, industry experts expect the volume of stem cell research to increase. Research involving stem cells could contribute to cures for a variety of diseases, including but not limited to Alzheimer's, cancer, juvenile diabetes, heart disease, Multiple Sclerosis, and Parkinson's.

In 1995, the Congress banned the use of federal funds to create or harm human embryos for scientific research. To circumvent this rule, scientists used private donations to fund the extraction of stem cells and federal grants to conduct the subsequent research, which allowed them to comply with the Congressional ban and still use federal funds for related research.

In 2001, in response to a shift in Presidential policy, the NIH ruled that federal funding could only be used to support research that used existing human embryonic stem cells. This directive effectively banned federal funding for most stem cell research. (At the time the directive was issued, only a few dozen embryonic stem cells were available for use.²⁵ Since then, all of the existing stem cells have been found to be contaminated with foreign cells, rendering them unusable.)

In response to the NIH directive, many biotech companies and stem cell researchers turned to private donors and state and local governments for the funding to provide crucial forward steps in stem cell research.

State governments have recognized the economic potential and the health benefits that could be realized by supporting biotech and stem cell research and have committed vast sums of money and resources to attract the overall industry. In 2001, only 14 states had economic development initiatives focused on biotech. In 2004, 40 states had biotech initiatives.²⁶

California was one of the first states to take a proactive step to support stem cell research after

the federal funding freeze. In 2002, the California State Legislature passed a joint resolution authorizing embryonic stem cell research within the state.²⁷ Although the bill did not provide research funding, scientists and investors saw it as a sign that California was a hospitable location for stem cell research. Two years later, California voters approved Proposition 71, which allocated \$3 billion in state funding to stem cell research conducted in California. Under this program, the California Institute for Regenerative Medicine will award \$300 million in stem cell research grants per year for ten years, significantly exceeding the \$25 million in federal grants that were awarded for embryonic stem cell research in 2004.²⁸

In response to California's referendum, many states have allocated new funding to stem cell research. Wisconsin appropriated \$375 million to support research within the state, and the Illinois State Comptroller recently proposed a referendum to create a state-funded institute to award \$1 billion in research grants in Illinois. New Jersey recently announced plans to invest \$380 million in the Stem Cell Institute of New Jersey.

The impact of all of these programs has yet to be determined; however, many states are concerned that they will lose significant ground to other states in biotech investment as well as scientific and medical talent and advances if they do not create competitive biotech and stem cell programs.

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²⁵ Robert Kolker, "The California Stem-Cell Gold Rush," *New York* magazine, January 3, 2005.

²⁶ Battelle Technology Partnership Practice and SSTI, "Laboratories of Innovation: State Bioscience Initiatives 2004," http://www.bio.org/local/battelle2004/main_report.pdf (accessed January 26, 2005).

²⁷ California Senate Bill No. 253, Chapter 789.

²⁸ Andrew Pollack, "California Stem Cell Program on Fast Track," *New York Times*, January 11, 2005, A16.

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