

Profile of Biomedical Research and Biotechnology Commercialization

Philadelphia–Wilmington–Atlantic City Consolidated Metropolitan Statistical Area

Overview and History of Biotechnology in Metropolitan Philadelphia

Philadelphia is second only to the New York metropolitan area as a center for the U.S. pharmaceutical industry. It is estimated that four-fifths of the world's largest pharmaceutical companies—including firms like SmithKline, Merck, and Rhone-Poulenc Rorer—have some presence in the region in the form of administrative offices, research and development, and/or manufacturing. Philadelphia also has a strong local research infrastructure, with major medical research centers at the University of Pennsylvania and Thomas Jefferson University.

The combination of research expertise and industrial experience creates the right conditions for new biotechnology firms. One of the region's first biotechnology firms was Centocor, founded in 1979 to produce a drug to inhibit blood clotting and then acquired by Johnson & Johnson in 1998. Cephalon, another local biotech firm with about 700 employees, was founded in 1987 by a research biologist who previously had worked at DuPont.

The Philadelphia–Wilmington–Atlantic City Consolidated Metropolitan Statistical Area had a year 2000 population of more than 6 million, making it the sixth-largest metropolitan area in the United States. During the 1990s population in the Philadelphia area grew by 5 percent. This consolidated metropolitan area includes Philadelphia and adjacent metropolitan counties in New Jersey, Delaware, and Maryland.

Biomedical Research Activity in Metropolitan Philadelphia

The Philadelphia metropolitan area has a considerable amount of biomedical research activity. More than 1,410 life scientists work in this area, and there are seven biological institutions granting life science PhDs, one of them ranking among the top 20 institutions nationally in life sciences research. Total NIH financial support flowing to this area is more than \$596 million annually.

Table 1. Metropolitan Philadelphia: Indicators of Biomedical Research

Biomedical Research Indicators	Year	Philadelphia-Wilmington- Atlantic City, PA--NJ--DE--MD CMSA
Life Scientists Employed	1998	1,410
Institutions Granting Life Science PhD Degrees	1999	7
Life Science PhDs Granted	1999	139
Universities Ranked among the Top 20 Nationally in Life Sciences Research	1982	1
Total NIH Financial Support	2000	\$596,195,344
NIH Funding for Medical Schools	1985	\$128,800
	1990	\$186,666
	1995	\$280,058
	2000	\$432,414
Biotechnology Patents	1975–79	679
	1980–89	1,309
	1990–99	3,214

The University of Pennsylvania ranks second among research institutions in the United States in terms of the amount of NIH funding received. During 2000 it received 840 research grants and a total of more than \$321 million in NIH support

**Table 2. Metropolitan Philadelphia:
Principal NIH–Funded Research Institutions, 2000**

Rank	Institution	Research Grants	Grant Amount (in millions)	Total NIH Support (in millions)
2	University of Pennsylvania	840	\$298.1	\$321.2
65	Thomas Jefferson University	194	\$61.5	\$66.5

Source: National Institutes of Health

Merck & Co. and SmithKline Beecham Corporation hold the most biotechnology patents issued to inventors in the 1990s in the Philadelphia region. SmithKline Beecham Corporation started holding patents in the 1990s and registered for 323 patents during the decade. Private firms and public institutions accounted for a majority of the increase in biotechnology patenting in the region during the 1990s.

Table 3. Metropolitan Philadelphia: Top Biotechnology-related-Patent Holders, by Decade, 1975–1999

Rank	Company Name	1970s	1980s	1990s
1	Merck & Co., Inc.	144	338	404
2	SmithKline Beecham Corporation			323
3	E.I. Du Pont de Nemours and Company	72	179	214
4	University of Pennsylvania	4	8	180
5	American Home Products Corporation	66	57	169
6	Individually Owned Patents	32	64	161
7	Du Pont Merck Pharmaceutical Company			140
8	Rohm and Haas Company	38	50	134
9	Thomas Jefferson University		10	94
10	Sterling Winthrop Inc.			86
11	Tristrata Technology, Inc.			66
12	Rhone-Poulenc Rorer Pharmaceuticals, Inc.			59
13	Zeneca Limited			57
14	McNeil-PPC, Inc.			55
15	American Cyanamid Company	2	6	45
16	Bristol-Myers Squibb Company	11	16	43
17	Temple University	2	10	37
18	Cephalon, Inc.			35
19	SmithKline Beecham PLC			33
20	Nanosystems LLC			27
21	ICI Americas, Inc.	8	41	26

Source: U.S. Patent & Trademark Office, 2001

Biotechnology Commercialization in Metropolitan Philadelphia

The Philadelphia region has attracted almost \$458 million in venture capital investment in biopharmaceutical firms since 1995. Investments have been made in 51 new firms. The region has had two initial public offerings by biotech companies since 1998 and has attracted more than \$127 million in pharmaceutical-biotech research alliances since 1996. The Philadelphia area has 19 publicly traded biotech companies with an aggregate market capitalization of nearly \$6 billion. The industry includes 10 firms with more than 100 employees and 42 firms belonging to the national Biotechnology Industry Association.

**Table 4. Metropolitan Philadelphia:
Indicators of Biotechnology Commercialization**

Indicator	Philadelphia-Wilmington- Atlantic City, PA--NJ--DE--MD CMSA	
Venture Capital Investment, 1995–2001	Number	51
	Amount	\$ 457,550,000
	Share	5%
Venture Capital Firms among the 50 Most Active in Biopharmaceutical Investment	1995–2001	3
Number of Initial Public Offerings by Biotech Companies	1998–2001	2
Value (in millions) of Research Alliances between Pharmaceutical Companies and Local Biotechnology Companies	Prior to 1990	\$5
	1990–1995	\$85
	1996–2001	\$127
Number of Publicly Traded Biotechnology Companies	2001	19
Market Capitalization (in millions) of Local Biotechnology Companies, 2001	2001	\$ 6,052
Local Biotechnology Firms Established	through 1980	8
	1981–1990	20
	1991–2001	16
	Not Available	2
	All Firms	46
Local Biotechnology Firms with More than 100 Employees	2001	10
NAICS 3254: Pharmaceuticals	Establishments	54
	Employment	8,961
NAICS 5413: Life Sciences R&D	Establishments	129
	Employment	4,539
Number of Members of the Biotechnology Industry Organization (BIO)	2001	42

Philadelphia's three largest biotechnology firms are Aventis Behring (4,700 employees), Alfa Laval Separations Inc. (575 employees), and Centocor Inc. (525 employees).

Table 5. Metropolitan Philadelphia: Principal Biotechnology Firms

Company	City	Employment	Segment
Aventis Behring, LLC	King of Prussia	4700	Reagents
Alfa Laval Separations Inc.	Warminster	575	Fermentation/Production
Centocor Inc.	Malvern	525	Therapeutics; Clinical Diagnostics; Production/Fermentation; Gene Therapy; Immunological Products
Cephalon Inc.	West Chester	300	Therapeutics; Equipment; Fermentation/Production; Toxicology
IGI Inc.	Buena	234	Drug Delivery; Veterinary; Vaccines; Plant Agriculture; Therapeutics; Commodity Chemicals
Inolex Chemical Company	Philadelphia	160	Specialty Chemicals
MedImmune Oncology Inc.	West Conshohocken	150	Therapeutics; Vaccines
CollaGenex Pharmaceuticals Inc.	Newtown	142	Therapeutics
Vineland Laboratories	Vineland	100	Drug Delivery; Veterinary; Vaccines; Plant Agriculture; Therapeutics; Commodity Chemicals
ViroPharma Inc.	Exton	92	Therapeutics

Source: Institute for Biotechnology Information, 2001

Table 6. Metropolitan Philadelphia: Venture Capital Investment in Biopharmaceutical Firms, 1995–2001

Year	Venture Capital
1995	\$23,500,000
1996	\$34,050,000
1997	\$55,420,000
1998	\$64,250,000
1999	\$55,230,000
2000	\$214,000,000
2001*	\$11,100,000

Source: PriceWaterhouseCoopers, 2001 (* Six Months)