

Profile of Biomedical Research and Biotechnology Commercialization

Seattle-Tacoma-Bremerton Consolidated Metropolitan Statistical Area

Overview and History of Biotechnology in Seattle

The Seattle area's biotechnology industry has been driven by spin-offs from the area's research institutions, particularly the University of Washington and the Fred Hutchinson Cancer Center. Founded in 1964, the Hutchinson Center has been a leader in cancer research, and it has encouraged the commercialization of its research findings. Several of the region's earliest and ultimately largest biotechnology companies, including Genetic Systems (founded in 1980) and Immunex (founded in 1981), were started by researchers from "the Hutch." Two researchers from the University of Washington and a colleague from British Columbia founded the region's other pioneering biotechnology firm, Zymogenetics, in 1981.

Today the Seattle area's largest biotechnology firm is Immunex, which manufactures therapies for cancer, infectious diseases, and immunological disorders and which employs more than 1,400. (The company was acquired by Amgen in December 2001 for \$16 billion). Since the 1980s, more than two dozen biotechnology start-ups have been established in the Seattle area; a majority of all biotechnology firms trace their roots to breakthroughs at one of the state's major research institutions. Growth of the local biotechnology industry has been supported in part by the nonprofit Washington Research Foundation, which was founded in 1981 and invests in new start-ups based on in-state research. The foundation has established a \$50 million capital investment fund to provide early-stage capital for technology firms in the state.

The Seattle-Tacoma-Bremerton Consolidated Metropolitan Statistical Area had a year 2000 population of 3,556,000, making it number 13 among the largest metropolitan areas in the United States. During the 1990s population in the Seattle area grew by nearly 20 percent.

Biomedical Research Activity in Seattle

Seattle has a considerable amount of biomedical research activity. The region has more than 1,800 life scientists. There is only one institution granting life science PhDs, but it is ranked among the nation's top twenty such institutions. Total NIH financial support flowing to the Seattle area exceeds \$500 million annually.

Table 1. Seattle: Indicators of Biomedical Research

Biomedical Research Indicators	Year	Seattle-Tacoma-Bremerton, WA CMSA
Life Scientists Employed	1998	1,810
Institutions Granting Life Science PhD Degrees	1999	1
Life Science PhDs Granted	1999	68
Universities Ranked among the Top 20 Nationally in Life Sciences Research	1982	1
Total NIH Financial Support	2000	\$504,375,867
NIH Funding for Medical Schools	1985	\$97,482
	1990	\$167,608
	1995	\$254,828
	2000	\$379,163
Biotechnology Patents	1975–79	9
	1980–89	93
	1990–99	770

Two institutions, the University of Washington and the Fred Hutchison Cancer Research Center, received more than \$100 million in NIH research support in 2000. The University of Washington is the third-ranking recipient of NIH support nationally

Table 2. Seattle: Principal NIH–Funded Research Institutions, 2000

Rank	Institution	Research Grants	Grant Amount (in millions)	Total NIH Support (in millions)
3	University of Washington	713	\$270.2	\$302.5
25	Fred Hutchison Cancer Research Center	184	\$121.5	\$142.4

Source: National Institutes of Health

Two local biotechnology firms, Zymogenetics and Immunex, are the leading biotechnology patent holders in metropolitan Seattle. These firms and other private firms have accounted for a majority of the increase in biotechnology patenting in the region during the 1990s.

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

Rank	Company Name	1970s	1980s	1990s
1	Zymogenetics, Inc.		8	105
2	Immunex Corporation		11	71
3	University Of Washington	1	5	49
4	Bristol-Myers Squibb Company		1	46
5	Cell Therapeutics, Inc.			43
6	Individually Owned Patents	1	12	40
7	Fred Hutchinson Cancer Research Center		4	39
8	Neorx Corporation		5	35
9	Icos Corporation Of America			34
10	Oncogen		1	24
11	Biomembrane Institute			23
12	Washington Research Foundation		4	22
13	Genetic Systems Corporation		9	15
14	Procyte Corporation		3	12
15	Corixa Corporation			10
16	Weyerhaeuser Company	5	2	10
17	Becton, Dickinson and Company			8
18	Oncogen, A Limited Partnership			7
19	Pathogenesis Corporation			7
20	Insite Vision, Inc.			6

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

Biotechnology Commercialization in Seattle

The Seattle metropolitan area has attracted more than \$400 million in venture capital investment in biopharmaceutical firms since 1995. The region has had eight initial public offerings by biotech companies since 1998 and has attracted more than \$500 million in pharmaceutical-biotech research alliances since 1996. Seattle has 15 publicly traded biotech companies with an aggregate market capitalization of nearly \$15 billion. The industry includes 7 firms with more than 100 employees.

Table 4. Seattle: Indicators of Biotechnology Commercialization

Indicator		Seattle-Tacoma- Bremerton, WA CMSA
Venture Capital Investment, 1995–2001	Number	44
	Amount	\$419,954,000
	Share	4%
Venture Capital Firms among the 50 Most Active in Biopharmaceutical Investment	1995–2001	1
Number of Initial Public Offerings by Biotech Companies	1998–2001	8
Value (in millions) of Research Alliances between Pharmaceutical Companies and Local Biotechnology Companies	Prior to 1990	\$68
	1990–1995	\$45
	1996–2001	\$579
Number of Publicly Traded Biotechnology Companies	2001	15
Market Capitalization (in millions) of Local Biotechnology Companies, 2001	2001	\$14,600
Local Biotechnology Firms Established	through 1980	1
	1981–1990	17
	1991–2001	11
	Not Available	1
	All Firms	30
Local Biotechnology Firms with More than 100 Employees	2001	7
NAICS 3254: Pharmaceuticals	Establishments	35
	Employment	4,581
NAICS 5413: Life Sciences R&D	Establishments	35
	Employment	320
Number of Members of the Biotechnology Industry Organization (BIO)	2001	19

The Seattle area's largest biotechnology firms are Immunex and Zymogenetics. Immunex is one of the ten largest biotechnology companies in the United States. Seattle's largest private biotech employers are Boeing (78,000) and Microsoft (15,400). None of the region's biotechnology firms ranks among the region's 20 largest private employers.

Table 5. Seattle: Principal Biotechnology Firms

Firm	City	Employment	Principal Products/Specializations
Immunex Corporation	Seattle	1000	Therapeutics; Fermentation/Production; Drug Delivery; Reagents; Gene Therapy
ZymoGenetics Inc.	Seattle	285	Therapeutics; Cell Culture; Fermentation/Production; Gene Therapy
Corixa Corporation	Seattle	260	Vaccines; Clinical Diagnostics; Therapeutics
ICOS Corporation	Bothell	252	Therapeutics; Equipment; Reagents; Cell Culture; Specialty Chemicals; Fungi
Cell Therapeutics Inc.	Seattle	178	Therapeutics
Nutraceutix Inc.	Redmond	120	Fermentation/Production; Animal Agriculture; Specialty Chemicals; Therapeutics; Drug Delivery Systems
Rosetta Inpharmatics Inc.	Kirkland	104	Bioinformatics
Targeted Genetics Corporation	Seattle	73	Gene Therapy; Therapeutics; Vaccines
NeoRx Corporation	Seattle	56	Therapeutics; Drug Delivery Systems
Molecumetics Ltd.	Bellevue	50	Therapeutics; Vaccines; Drug Delivery Systems; Plant Agriculture

Source: Institute for Biotechnology Information, 2001

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

Year	Venture Capital
1995	\$36,775,000
1996	\$85,679,000
1997	\$42,690,000
1998	\$50,785,000
1999	\$90,480,000
2000	\$91,045,000
2001*	\$22,500,000

Source: PriceWaterhouseCoopers, 2001 (* Six Months)