



## **BIOSCIENCE**

### ***Metro Denver and Northern Colorado Industry Cluster Profile***

The bioscience cluster is a dynamic, entrepreneurial group of industries. With products and services ranging from veterinary supplies and chemical testing kits to cutting-edge pharmaceuticals and medical devices, the bioscience cluster contributes to the growth of other clusters including energy and information technology in the nine-county Metro Denver and Northern Colorado region.<sup>1</sup> The bioscience cluster includes two subclusters: (1) medical devices and instruments and (2) pharmaceuticals and biotechnology.

With over 15,090 bioscience workers in approximately 520 companies, the nine-county region has a significant foundation on which to build and expand the bioscience cluster. The region is home to numerous public and private bioscience research assets, including the Anschutz Medical Campus of the University of Colorado; National Jewish Health; the Barbara Davis Center for Childhood Diabetes; the Eleanor Roosevelt Institute; the Webb-Waring Institute for Cancer, Aging, and Antioxidant Research; and the Centers for Disease Control and Prevention's National Center for Zoonotic, Vector-borne, and Enteric Diseases in Fort Collins. In 2009, the Colorado Institute for Drug, Device and Diagnostic Development (CID<sup>4</sup>) was formed to accelerate life science discoveries and to bridge the gap between life sciences research and successful bioscience product developments. The institute is a collaborative effort of all sectors of the Colorado life science community, including universities, bioscience companies, academic groups, and professional associations. This group of stakeholders seeks to create bioscience companies that are positioned to hire employees, establish relationships with industry partners, and execute clinical development plans vital to industry growth and success.

Another operating advantage for nine-county bioscience companies exists at the former Fitzsimons Army Medical Center. The 578-acre site in Aurora is becoming home to the Fitzsimons Life Science District and the Anschutz Medical Campus. As projects are completed, Fitzsimons will evolve into one of the most advanced bioscientific communities in the world. Included at the site is the 184-acre Colorado Science + Technology Park at Fitzsimons, which houses a business incubator with 14 pre-built labs, 21 executive office suites, and many shared services and amenities. Another key partner at Fitzsimons is the \$1.5 billion Anschutz Medical Campus, which includes the University of Colorado Hospital as well as facilities for University Physicians, Inc. The award-winning Children's Hospital is adjacent to the campus, as is the future home of the new Denver Veterans Affairs Medical Center. Upon completion, the entire district and medical campus will account for approximately 18 million square feet of development.

The nine-county region's colleges and universities continue to fuel bioscience growth. The region offers 10 higher education institutions with bioscience programs. According to *U.S. News & World Report*, the University of Colorado at Boulder, the University of Colorado Denver, and Colorado State University each have bioscience graduate programs that ranked within the nation's top 100 in 2007. In 2010, the University of Colorado Denver announced plans for its first Bioengineering Department. Beginning in 2012, the first class of students will enter the undergraduate program that plans to offer masters of science and doctoral degrees and will also allow students to receive instruction at the University of Colorado at Boulder and the University of Colorado School of Medicine. Bioengineering applies engineering principles to the biological sciences and medical fields to solve problems in medical research and clinical medicine for the improvement of people's lives. The University of Colorado at Boulder was awarded a \$1.2 million grant in 2009 from a

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<sup>1</sup> The nine-county Metro Denver and Northern Colorado region consists of Adams, Arapahoe, Boulder, Broomfield, Denver, Douglas, Jefferson, Larimer, and Weld Counties.

private foundation that will enable university researchers to explore changes in cellular proteins. Researchers say an understanding of changes in cell proteins could support the development of treatments for cancer and other diseases. In Northern Colorado, Colorado State University recently broke ground on the 72,000-square-foot Research Innovation Center, which will include bioscience incubator space that should be completed in 2010. In 2009, the University of Colorado at Boulder celebrated the groundbreaking of its 257,000-square-foot biotechnology building that will house over 500 faculty researchers and support staff. The Jennie Smoly Caruthers Biotechnology Building will also house the university's Colorado Initiative in Molecular Biotechnology, the chemical and biological engineering departments, and the biochemistry division. The first phase of construction should be completed in 2011.

Private bioscience companies are also growing and thriving in the nine-county region. In 2009, Lakewood-based CaridianBCT was awarded a \$5.6 million grant from the U.S. Department of Defense which will help the company further develop its blood transfusion safety technology. The proprietary technology uses ultraviolet light and riboflavin to limit inflections in transfused blood and has particular applications for medical care during combat. Another member of Metro Denver's biotech community is also planning to grow. Westminster-based Allos Therapeutics is expecting to hire additional employees after receiving FDA approval for a new cancer-fighting drug.

Government support and private investment also fuels Colorado's bioscience growth. The Colorado Legislature created the Bioscience Discovery Evaluation Grant Program (BDEGP) in 2006 to help Colorado bioscience companies and research institutions develop and commercialize cutting-edge technologies. Approximately \$16.7 million in program awards had been distributed through the end of fiscal year 2009, including \$3.9 million in funding for proof-of-concept activities and \$2.3 million in grant support for early-stage bioscience companies. Another \$10.5 million in BDEGP awards was distributed to help research institutions and private companies grow the infrastructure necessary to commercialize bioscience technologies. In April 2008, Colorado Governor Bill Ritter signed a five-year, \$26.5 million package that created a Bioscience and Life Science Fund. The fund will provide grants to Colorado start-up companies and research institutions seeking to commercialize new biotechnology drugs, biofuels, medical devices, and nanotechnology.

## ***Bioscience Economic Profile***

### **Medical Devices and Instruments**

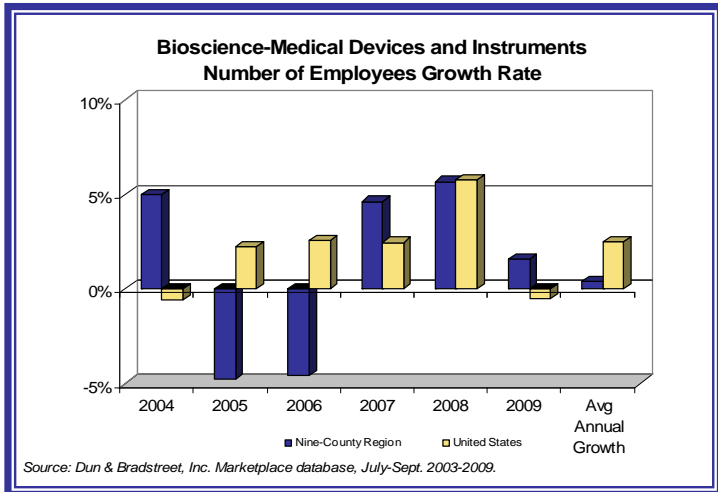
The medical devices and instruments subcluster includes companies that engineer, research, design, and manufacture medical equipment used in the healthcare industry. The medical devices and instruments subcluster is defined by seven, six-digit North American Industry Classification System (NAICS) codes.

***The nine-county region ranked sixth of the 50 largest metro areas for medical devices and instruments employment concentration in 2009.*** With direct employment in medical devices and instruments of about 9,480 employees, the region ranked 11th in absolute employment. As of 2009, about 86 percent of Colorado's medical devices and instruments employment was located in the nine-county region.

	<b><u>Nine-County Region</u></b>	<b><u>U.S.</u></b>
Direct Employment, 2009	9,480	430,190
Number of Direct Companies, 2009	270	14,420
One-Year Direct Employment Growth, 2008-2009	1.6%	-0.5%
Five-Year Direct Employment Growth, 2004-2009	2.0%	13.0%
Avg. Annual Direct Employment Growth, 2004-2009	0.4%	2.5%
Direct Employment Concentration	0.6%	0.4%

*Sources: Dun & Bradstreet, Inc. Marketplace database, July-Sept. 2003-2009; Development Research Partners.*

## Medical Devices and Instruments Employment



- In 2009, medical devices and instruments companies employed about 0.6 percent of the nine-county region's total employment base. The comparable national employment concentration was 0.4 percent.
- The medical devices and instruments subcluster directly employed about 9,480 people in the nine-county region.
- Employment in the medical devices and instruments subcluster increased two percent between 2004 and 2009, compared with a 13 percent increase nationally.
- Medical devices and instruments

employment was concentrated in Boulder (33 percent), Jefferson (28 percent), Larimer (15 percent), and Arapahoe (15 percent) Counties. Nearly 58 percent of medical devices and instruments employees were involved in manufacturing surgical instruments and appliances, orthopedics, and prosthetics.

## Medical Devices and Instruments Wages

The 2008 average annual salary for medical devices and instruments subcluster workers in the region was \$62,770, compared with \$69,100 nationwide. The nine-county region's medical devices and instruments total payroll was more than \$586 million in 2008.

### Denver-Aurora-Broomfield MSA Occupational Salaries, 2008 Annual Average

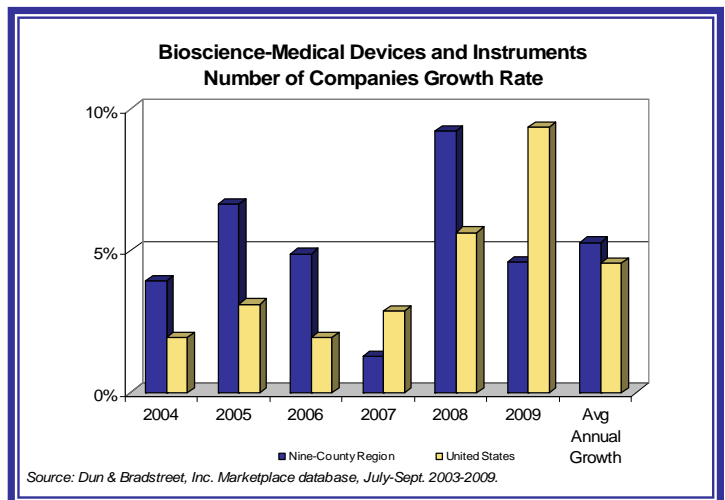
Biochemists and Biophysicists	\$82,160
Biomedical Engineers	\$82,850
Medical and Clinical Laboratory Technicians	\$35,120
Medical and Clinical Laboratory Technologists	\$54,360

Note: Mean annual salary data is for the ten-county Denver-Aurora-Broomfield Metropolitan Statistical Area (MSA) consisting of Adams, Arapahoe, Broomfield, Clear Creek, Denver, Douglas, Elbert, Gilpin, Jefferson, and Park Counties.

Source: U.S. Bureau of Labor Statistics, Metropolitan Area Occupational Employment and Wage Estimates, May 2008, [www.bls.gov](http://www.bls.gov).

## Medical Devices and Instruments Companies

- Over 270 medical devices and instruments companies operated in the nine-county region in 2009.
- The number of nine-county medical devices and instruments companies increased 5.3 percent per year between 2004 and 2009, compared with 4.6 percent growth per year nationally.
- Nearly 69 percent of the region's medical devices and instruments companies employed fewer than 10 people, while 3.3 percent employed 250 or more.
- About 59 percent of the region's medical devices and instruments companies manufactured surgical instruments and appliances, orthopedics, and prosthetics. Forty-three percent of the medical devices and instruments subcluster companies were located in Boulder and Jefferson Counties.



### Major Medical Devices and Instruments Companies

- Baxa Corporation  
[www.baxa.com](http://www.baxa.com)
- CaridianBCT, Inc.  
[www.caridianbct.com](http://www.caridianbct.com)
- Cochlear Americas  
[www.cochlearamericas.com](http://www.cochlearamericas.com)
- ConMed Corporation  
[www.conmed.com](http://www.conmed.com)
- Covidien  
[www.covidien.com](http://www.covidien.com)
- Delphi Medical Systems  
[www.delphimedical.com](http://www.delphimedical.com)
- HEI, Inc.  
[www.heii.com](http://www.heii.com)
- Hach Company  
[www.hach.com](http://www.hach.com)
- Medtronic Navigation  
[www.medtronicnavigation.com](http://www.medtronicnavigation.com)
- nSpire Health  
[www.nspirehealth.com](http://www.nspirehealth.com)
- Particle Measuring Systems  
[www.pmeasuring.com](http://www.pmeasuring.com)
- Sorin Group USA, Inc.  
[www.sorin.com](http://www.sorin.com)
- Sunrise Medical  
[www.sunrisemedical.com](http://www.sunrisemedical.com)
- Water Pik, Inc.  
[www.waterpik.com](http://www.waterpik.com)

### Pharmaceuticals and Biotechnology

Pharmaceutical companies manufacture, research, and develop pharmaceutical drugs. Biotechnology companies utilize cellular and molecular biology and medicinal chemistry to develop and commercialize therapeutic medicines. The pharmaceuticals and biotechnology subcluster is defined by five, six-digit North American Industry Classification System (NAICS) codes.

***The nine-county region ranked 18th out of the 50 largest metro areas for pharmaceuticals and biotechnology employment concentration in 2009.*** With 5,610 pharmaceutical and biotechnology workers, the region ranked 16th out of the 50 largest metro areas in absolute employment. As of 2009, about 93 percent of the employment in Colorado's pharmaceuticals and biotechnology cluster was located in the nine-county region.

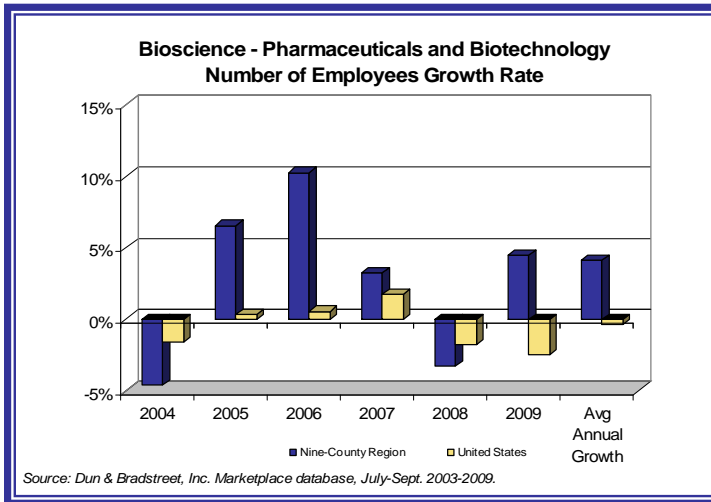
	<b>Nine-County Region</b>	<b>U.S.</b>
Direct Employment, 2009	5,610	468,970
Number of Direct Companies, 2009	250	14,980
One-Year Direct Employment Growth, 2008-2009	4.5%	-2.5%
Five-Year Direct Employment Growth, 2004-2009	22.5%	-1.7%
Avg. Annual Direct Employment Growth, 2004-2009	4.1%	-0.3%
Direct Employment Concentration	0.4%	0.4%

*Sources: Dun & Bradstreet, Inc. Marketplace database, July-Sept. 2003-2009; Development Research Partners.*

### Pharmaceuticals and Biotechnology Wages

The 2008 average annual salary for pharmaceuticals and biotechnology workers in the nine-county region was \$88,700, compared with \$95,760 nationwide. Total nine-county payroll in pharmaceuticals and biotechnology exceeded \$476 million in 2008. (Please see the "Medical Devices and Instruments Wages" section of this report for relevant occupational wage information.)

## Pharmaceuticals and Biotechnology Employment



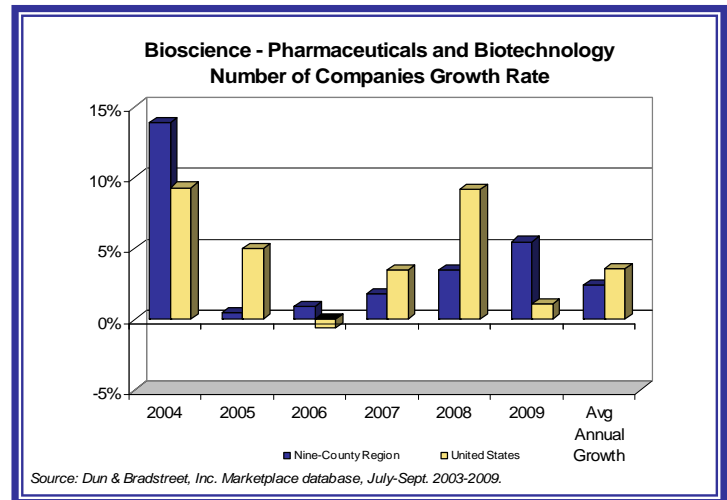
- Pharmaceuticals and biotechnology companies accounted for about 0.4 percent of the nine-county region's total employment base in 2009, the same employment concentration as the national average for the subcluster.
- The pharmaceuticals and biotechnology subcluster directly employed about 5,610 people in the nine-county region.
- Nine-county employment in the pharmaceuticals and biotechnology subcluster increased 22.5 percent from 2004 to 2009, compared with a 1.7 percent decline nationally.

pharmaceuticals and biotechnology workers were employed in pharmaceutical preparations.

- About 76 percent of the nine-county region's pharmaceuticals and biotechnology workers were located in Boulder (45 percent), Larimer (17 percent), and Broomfield (14 percent) Counties.

## Pharmaceuticals and Biotechnology Companies

- About 250 pharmaceuticals and biotechnology companies operated in the nine-county region in 2009.
- The number of pharmaceuticals and biotechnology companies grew 2.4 percent per year between 2004 and 2009, compared with a 3.6 percent average annual increase nationwide.
- Nearly 72 percent of the nine-county region's pharmaceuticals and biotechnology companies employed fewer than 10 people, while two percent employed 250 or more.
- Over 75 percent of companies in the pharmaceuticals and biotechnology subcluster were involved in pharmaceutical preparations or biological research.



## Major Pharmaceuticals and Biotechnology Companies

- Allos Therapeutics, Inc.  
[www.allos.com](http://www.allos.com)
- Amgen Inc.  
[www.amgen.com](http://www.amgen.com)
- Array Biopharma, Inc.  
[www.arraybiopharma.com](http://www.arraybiopharma.com)
- Chemizon, Inc.  
[www.chemizon.com](http://www.chemizon.com)
- Colorado Serum Company  
[www.colorado-serum.com](http://www.colorado-serum.com)
- GlobelImmune, Inc.  
[www.globeimmune.com](http://www.globeimmune.com)
- Heska Corporation  
[www.heska.com](http://www.heska.com)
- Quark Pharmaceuticals  
[www.quarkpharma.com](http://www.quarkpharma.com)
- Roche Colorado Corp.  
[www.rochecolorado.com](http://www.rochecolorado.com)
- Sandoz, Inc.  
[www.sandoz.com](http://www.sandoz.com)
- TOLMAR, Inc.  
[www.tolmar.com](http://www.tolmar.com)

## ***Key Reasons for Bioscience Companies to Locate in the Nine-County Region***

The region is an emerging bioscience location offering:

### **1. The ability to recruit and retain technical and scientific employees**

- Almost 36 percent of Colorado's adult population has completed a bachelor's or higher-level degree. That makes Colorado the second-most educated state in the country behind Massachusetts. (U.S. Census Bureau, 2008 American Community Survey)
- Colorado ranked eighth in the number of Ph.D. scientists and engineers as a percent of the workforce in 2006. This measure points to a large pool of potential innovators in the state. (National Science Foundation, 2008)
- Colorado offers 10 higher education institutions with bioscience programs. The University of Colorado at Boulder, the University of Colorado Denver, and Colorado State University each have bioscience graduate programs that ranked within the nation's top 100 in 2007. (*U.S. News & World Report*, 2009)
- Colorado is home to numerous public and private bioscience research assets, including the Anschutz Medical Campus of the University of Colorado; National Jewish Health; the Barbara Davis Center for Childhood Diabetes; the Eleanor Roosevelt Institute; the Webb-Waring Institute for Cancer, Aging, and Antioxidant Research; and the Centers for Disease Control and Prevention's National Center for Zoonotic, Vector-borne, and Enteric Diseases in Fort Collins.
- Colorado hospitals have received numerous HealthGrades awards. Centura Health-Penrose St. Francis Health Services in Colorado Springs ranked among "America's 50 Best Hospitals" in 2009 and joined four other Colorado hospitals as winners of the 2010 Distinguished Hospital for Clinical Excellence award. Ten of the state's hospitals won 2009/2010 awards for Outstanding Patient Experience, three won awards for Women's Health Excellence, and several won awards for excellence in various types of specialty care. (Healthgrades, Inc., 2010)
- Thomson Reuters' 2008 "100 Top Hospitals" ranking recognized several Colorado healthcare facilities among the nation's best. St. Anthony Central in Denver ranked among the nation's best teaching hospitals in the "Performance Improvement" category, and Rose Medical Center in Denver won recognition among teaching hospitals in the "National Benchmarks for Success" category. (Thomson Reuters, 2009)
- Denver ranked first among the nation's most desirable places to live in a 2008 poll by the Pew Research Center. Denver was a consistent favorite when survey results were cross-tabulated by gender, income and education, and political preference. (Pew Research Center, 2009)
- Colorado ranked third in the nation for its ability to support a knowledge- and technology-based economy, according to the Milken Institute's 2008 *State Technology and Science Index*. The index measured 77 indicators in five categories – education, the science and engineering workforce, research and development, high-tech employment concentration, and entrepreneurial environment. (Milken Institute, 2008)
- The Milken Institute's 2009 *North America's High-Tech Economy: The Geography of Knowledge-Based Industries* ranked Boulder among the nation's top ten "tech poles" in the scientific research and development services industry sector. The report defines tech poles as metro areas with concentrated tech activity and employment. (Milken Institute, *North America's High-Tech Economy: The Geography of Knowledge-Based Industries*, 2009)
- Colorado residents enjoy an active, outdoor lifestyle. Two Colorado cities won top-five honors in the 2009 "Fittest Cities" ranking by *Men's Fitness* magazine. Colorado Springs ranked second and Denver ranked fourth. Denver's park acreage, air quality, outdoor

environment, and other factors contributed to the city's high ranking. (*Men's Fitness*, 2009)

- The Metro Denver WIRED Initiative – a four-year, \$15 million regional workforce development grant housed at the Metro Denver Economic Development Corporation – ended in early 2010. WIRED worked to develop a labor force skilled in STEM (science, technology, engineering, and math) for the nine-county region's fastest-growing industries, including bioscience. WIRED awarded several grants to bioscience programs. (Metro Denver WIRED Initiative)

## **2. Affordable operating costs**

- Bioscience companies can recruit affordable, productive employees as the nine-county average wage for bioscience workers is slightly below the national average.
- The nine-county region offers a variety of real estate opportunities for bioscience companies, ranging from fully-furnished executive suites to build-to-suit labs and office space.
- The Colorado Science + Technology Park at Fitzsimons is a 184-acre development adjacent to the Anschutz Medical Campus. The park includes two buildings with a total of 80,000 square feet of bioscience incubator space which includes 14 pre-built labs, 21 executive office suites, and many shared services and amenities. Thirty companies currently operate from the facilities. At full buildout, the park will offer six million square feet dedicated to life science companies. (Fitzsimons Life Sciences District)
- Colorado State University recently broke ground on the 72,000-square-foot Research Innovation Center in Fort Collins. The center will include bioscience incubator space, and construction should be completed in 2010. (Colorado State University)

## **3. A pro-business environment and competitive tax structure**

- Colorado's simple corporate income tax structure is based on single-factor apportionment, which allows companies to pay taxes based solely on their sales in the state. Colorado's corporate income tax rate of 4.63 percent is one of the lowest in the nation. (State of Colorado; The Tax Foundation)
- Colorado has one of the nation's most favorable business tax climates. The state ranked among the top 15 in the nation on the Tax Foundation's *2010 State Business Tax Climate Index*, which measures how corporate and individual income taxes, property and sales taxes, and unemployment insurance tax affect economic activity. (The Tax Foundation, 2009)
- Colorado is the nation's third-best state for business, according to an annual ranking by CNBC.com. The ranking was based on 40 metrics in 10 broad categories, and Colorado received top-10 rankings in the categories that measure business friendliness, access to capital, and overall economy. (CNBC, 2009)
- Colorado ranked fourth overall on *Forbes'* 2009 "Best States for Business" list. Rankings were based on each state's regulatory environment, business costs, labor supply, quality of life, economic climate, and growth potential. Colorado received top-20 rankings for five of the six criteria, including labor supply (first overall) and growth potential (second overall). (*Forbes*, 2009)
- Several Colorado metropolitan areas ranked high on *Forbes'* 2009 list of the "Best Places for Business and Careers," which considers the cost of doing business, educational attainment, and other factors. The Fort Collins metro area ranked second overall, Colorado Springs ranked 10th, the Denver-Aurora-Broomfield region ranked 14th, and Boulder ranked 20th. (*Forbes*, 2009)
- Manufacturing equipment used in clean room operations is exempt from state sales tax. (Exemption clarified in Colorado House Bill 07-1277)

#### 4. Access to financial resources to fund research and development

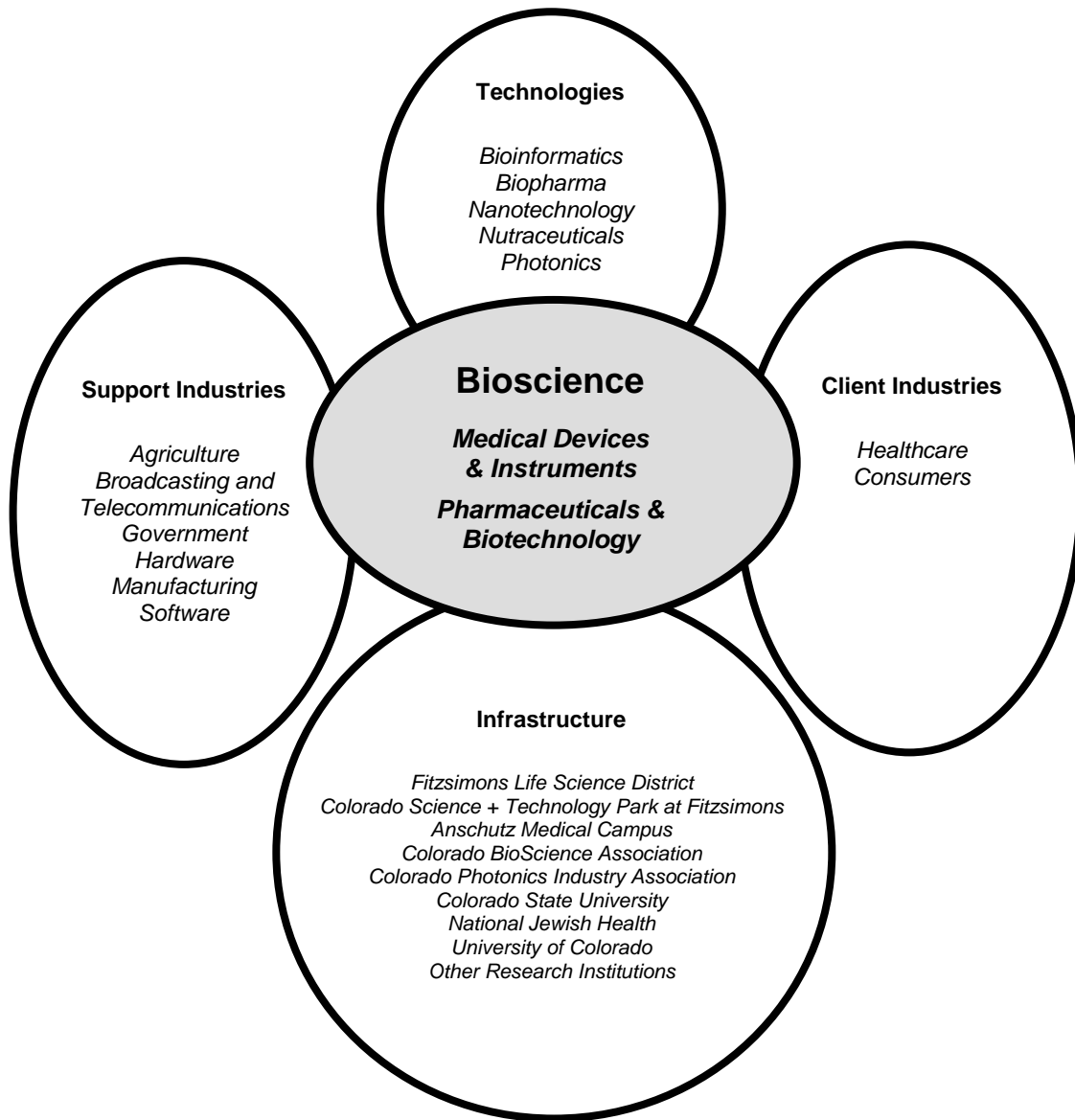
- The Colorado Legislature created the Bioscience Discovery Evaluation Grant Program in 2006. The program is designed to help Colorado bioscience companies and research institutions develop and commercialize cutting-edge technologies. In 2008, Colorado Governor Bill Ritter signed a five-year, \$31 million package that continues to support the program and start-up companies and research institutions seeking to commercialize new biotechnology drugs, biofuels, medical devices, and nanotechnology. (Colorado Office of Economic Development and International Trade, 2009)
- Colorado offers several public and private sources of business funding including the Colorado Small Business Development Centers ([www.coloradosbdc.org](http://www.coloradosbdc.org)), the Certified Capital Companies Program, and the Colorado Venture Capital Authority. (Contact the Colorado Office of Economic Development and International Trade for more information.)
- Colorado has five venture firms currently investing in bioscience: Morgenthaler Ventures, Sequel Venture Partners, Tango/HCV, Boulder Ventures, and Aweida Venture Partners.
- The University of Colorado School of Medicine ranked 22nd out of 129 academic medical schools for total National Institutes of Health funding in fiscal year 2008. (National Institutes of Health, 2009)
- The University of Colorado School of Medicine – Department of Pediatrics won more research awards from the National Institutes of Health (NIH) in fiscal year 2008 than any other U.S. pediatrics program. Pediatric funding from the NIH goes towards research of childhood cancer, diabetes, and other conditions. (*Denver Business Journal*, 2009)
- Colorado business and research organizations more than doubled the impact of the NIH funding they received in fiscal year 2007, according to a report by Families USA's Global Health Initiative. The report ranked Colorado's economic multiplier of \$2.34 per NIH dollar fifth highest in the nation. (Families USA, *In Your Own Backyard: How NIH Funding Helps Your State's Economy*, 2009)

### ***Bioscience Industry Cluster Definition***

<b>NAICS Code*</b>	<b>NAICS Description</b>	<b>SIC Code</b>	<b>SIC Description</b>
<b>Medical Devices &amp; Instruments</b>			
333298 (P)	All other industrial machinery mfg.	3559-9922	Pharmaceutical machinery
334510	Electromedical apparatus mfg.	3845	Electromedical equipment
334516	Analytical laboratory instrument mfg.	3826	Analytical instruments
334517	Irradiation apparatus mfg.	3844	X-ray apparatus & tubes
339112	Surgical & medical instrument mfg	3841	Surgical & medical instruments
339113	Surgical appliance & supplies mfg.	3821	Laboratory apparatus & furniture
339113	Surgical appliance & supplies mfg.	3842	Orthopedics, prosthetics, & surgical appliances
339114	Dental equip. & supplies mfg.	3843	Dental equipment & supplies
<b>Pharmaceuticals &amp; Biotechnology</b>			
325411	Medicinal & botanical mfg.	2833	Medicinals & botanicals
325412	Pharmaceutical preparation mfg.	2834	Pharmaceutical preparations
325413	In-vitro diagnostic substance mfg.	2835	Diagnostic substances
325414	Biological product (except diagnostic) mfg.	2836	Biological products except diagnostic
541711	Research & development in biotechnology	8731-01	Biological research
541711	Research & development in biotechnology	8731-9902	Medical research (commercial)
541711	Research & development in biotechnology	8733-01	Noncommercial biological research organization

\*(P) indicates that only part of the NAICS industry category is represented in the industry cluster definition.

## ***Bioscience Industry Cluster Relationships***



*For additional information, contact us:*



**Metro Denver**  
Economic Development Corporation

1445 Market Street  
Denver, CO 80202-1790  
303.620.8092  
e-mail: [info@metrodenver.org](mailto:info@metrodenver.org)  
[www.metrodenver.org](http://www.metrodenver.org)  
[www.metrodenverGIS.org](http://www.metrodenverGIS.org)