

Industry Overview

Bioscience is a thriving industry in the nine-county Metro Denver and Northern Colorado region¹, with support from four top-ranked university bioscience programs, one of the highest per-capita concentrations of federally funded research facilities in the nation, and numerous incubators and accelerator programs. Opportunities for bioscience companies exist to develop technologies from concept to commercialization without having to leave the area. Further, the region's scientific and entrepreneurial talent, supportive business climate, and competitive tax structure contribute to a dynamic and growing base of bioscience companies.



About 84 percent of the state's bioscience companies are located in the nine-county region, with the center of the region's bioscience cluster located at the Fitzsimons Life Science District and the adjacent Anschutz Medical Campus. As one of the most ambitious medical developments in the nation, the \$5.2 billion project encompasses 578 total acres and more than six million square feet of cutting-edge space and services that will eventually support more than 43,000 bioscience and healthcare professionals.

Companies in the region continue to develop new products from inception to commercialization. Nearly 1,000 medical devices were approved by companies headquartered in Colorado, with over 60 percent concentrated in cardiovascular, general and plastic surgery, clinical chemistry, and radiology. Bioscience-related financings reached \$1.2 billion and two life science companies went public in 2017. Companies in the region received at least 10 FDA approvals or clearances on biologics, medical devices, and drugs in 2017. The FDA accepted several New Drug Applications (NDAs) and granted one Investigational Device Exemption (IDE) to companies based in the region. At least five companies were granted U.S. patents or European CE marks.

The bioscience cluster is divided into two subclusters, each of which specializes in distinct aspects of the biosciences: (1) medical devices and diagnostics and (2) pharmaceuticals and biotechnology. Combined, the bioscience industry in the nine-county region is home to more than 16,100 workers in almost 730 companies. Between 2011 and 2017, bioscience employment in the nine-county region grew 7.5 percent, compared with 5.4 percent nationally. In 2017, the bioscience cluster posted 1.9 percent employment growth over-the-year and grew for the seventh-consecutive year, adding over 1,120 workers since 2011.

The medical devices and diagnostics subcluster represents roughly 70 percent of the total bioscience employment base in the region, while pharmaceuticals and biotechnology represents 30 percent. In 2017, the pharmaceuticals and biotechnology subcluster grew 4.4 percent in 2017, contributing 68 percent of the total bioscience employment increase over-the-year. The medical devices and diagnostics subcluster posted 0.9 percent growth in the region in 2017 and grew for the seventh-consecutive year. In 2017, the region had the eighth-largest medical devices and diagnostics sector in the nation. Recently, investments from international powerhouses such as Agilent Technologies and AstraZeneca have led smaller companies and local mainstays to spur growth in the cluster.

A related subcluster, although not specifically included in this report, is agricultural biotechnology. The agricultural biotechnology subcluster includes companies that utilize distinct elements of conventional breeding, biochemistry, molecular genetics, and plant physiology to improve the health of humans and animals. This subcluster employs nearly 1,170 workers in 110 companies in the region and grew an average of 4.4 percent per year between 2012 and 2017, compared with a 0.1 percent increase nationwide.

These subclusters have joined with the region's emerging digital health industry. Born from the collaboration between healthcare and software innovations, the region is a recognized national leader in this arena. According to StartUp Health, Denver ranked among the top 10 U.S. cities for digital health funding, with five deals totaling \$192 million in 2017. Prime Health, StartUp Health Colorado, and Catalyst HTI are examples of

¹ The nine-county region is comprised of two principal areas, Metro Denver and Northern Colorado. Metro Denver consists of Adams, Arapahoe, Boulder, Broomfield, Denver, Douglas, and Jefferson counties. Northern Colorado consists of Larimer and Weld counties.

partnerships to grow the region's digital health presence. Many bioscience organizations, including the Colorado BioScience Association, are integrating healthcare innovation and technologies into their business strategies.

Medical Devices and Diagnostics Economic Profile

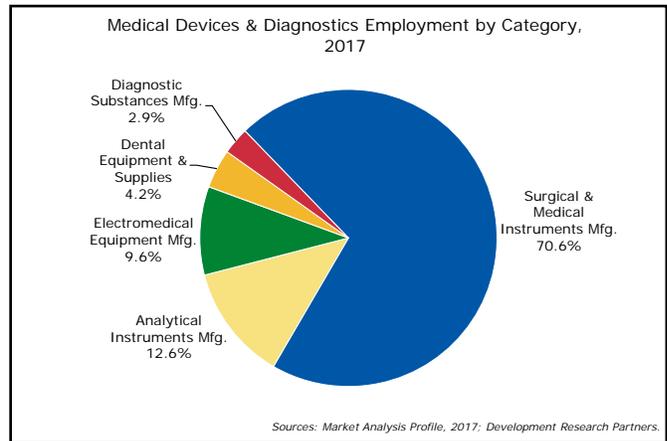
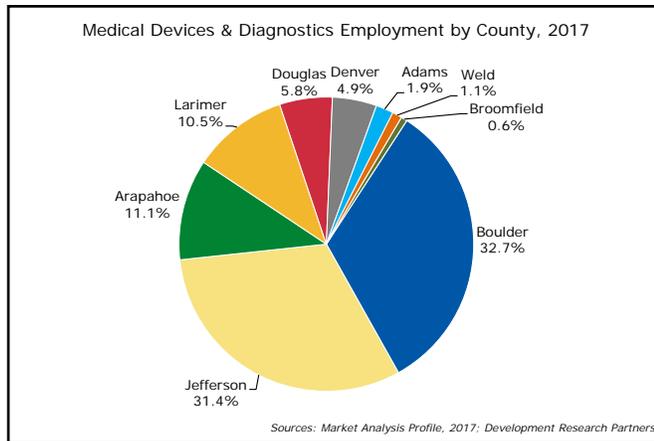
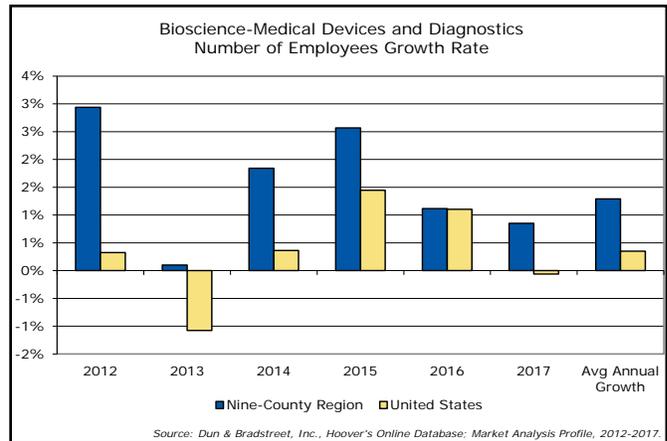
The medical devices and diagnostics subcluster includes companies that engineer, research, design, and manufacture medical equipment. The medical devices and diagnostics subcluster consists of eight, six-digit North American Industry Classification System (NAICS) codes.

Nine-County Rankings²

Medical devices & diagnostics direct employment rank	8th
Medical devices & diagnostics employment concentration rank	12th

Medical Devices & Diagnostics Employment and Company Profile, 2017		
	Nine-County Region	United States
Direct employment, 2017	11,240	451,680
Number of direct companies, 2017	360	18,520
One-year direct employment growth, 2016-2017	0.9%	-0.1%
Five-year direct employment growth, 2012-2017	6.6%	1.8%
Avg. annual direct employment growth, 2012-2017	1.3%	0.4%
Direct employment concentration	0.5%	0.3%

Sources: Dun & Bradstreet, Inc., Hoover's Online Database; Market Analysis Profile, 2012-2017; Development Research Partners.



² Direct employment rank based on the number of employees in the industry cluster in a region. Employment concentration rank based on the direct cluster employment in a region expressed as a percent of total employment in all industries in the same region. Rankings are for the 50 largest metropolitan statistical areas (MSAs). No multiplier effects are included. 1st = highest for both rankings.

Major Medical Devices and Diagnostics Companies (top 10 based on employment size)

- AlloSource
www.allosource.org
- Cochlear Americas
www.cochlear.com/us
- Hach Company
www.hach.com
- LivaNova PLC
www.livanova.com
- Medtronic PLC
www.medtronic.com
- Particle Measuring Systems
www.pmeasuring.com
- Rocky Mountain Orthodontics
www.rmortho.com
- SomaLogic, Inc.
www.somallogic.com
- Terumo BCT, Inc.
www.terumobct.com
- Zimmer Biomet
www.zimmerbiomet.com

Pharmaceuticals and Biotechnology Economic Profile

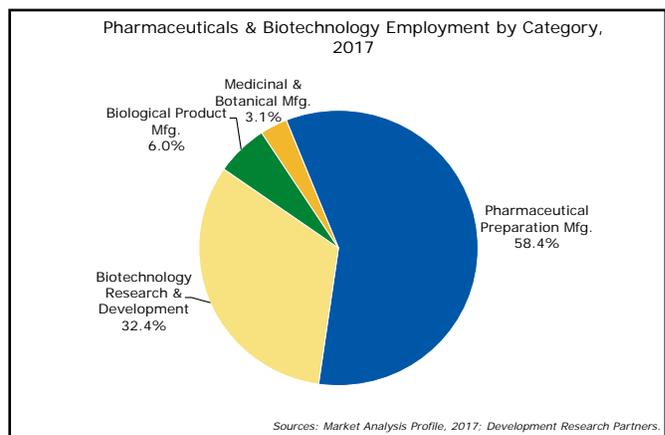
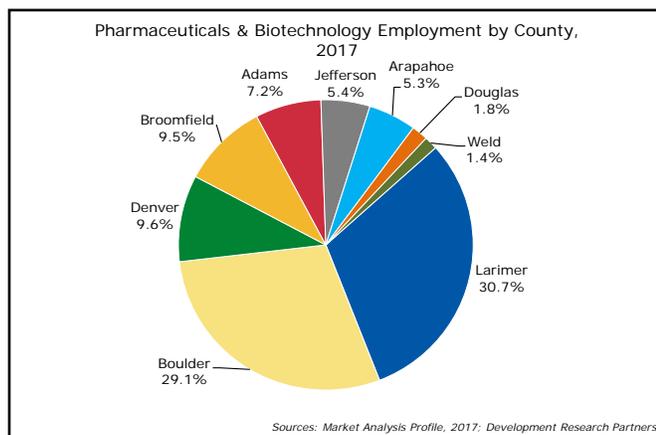
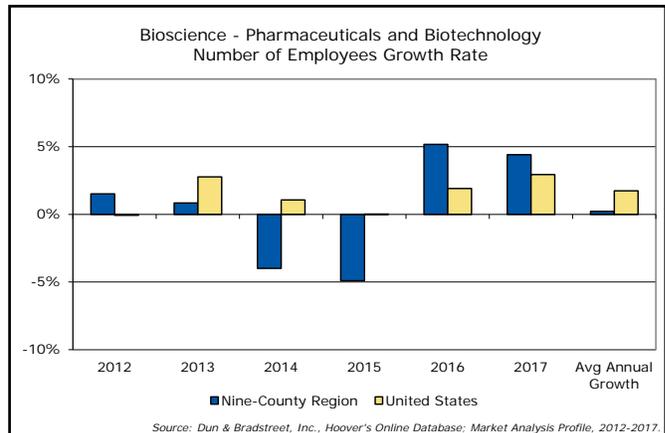
Pharmaceutical companies manufacture, research, and develop pharmaceutical drugs. Biotechnology companies utilize cellular and molecular biology and medicinal chemistry to develop and commercialize therapeutic medicines. The pharmaceuticals and biotechnology subcluster consists of four, six-digit North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

Nine-County Rankings³

Pharmaceuticals & biotechnology direct employment rank	17th
Pharmaceuticals & biotechnology employment concentration rank	28th

Pharmaceuticals & Biotechnology Employment and Company Profile, 2017		
	Nine-County Region	United States
Direct employment, 2017	4,860	468,110
Number of direct companies, 2017	370	21,640
One-year direct employment growth, 2016-2017	4.4%	2.9%
Five-year direct employment growth, 2012-2017	1.1%	9.0%
Avg. annual direct employment growth, 2012-2017	0.2%	1.7%
Direct employment concentration	0.2%	0.3%

Sources: Dun & Bradstreet, Inc., Hoover's Online Database; Market Analysis Profile, 2012-2017; Development Research Partners.



³ Direct employment rank based on the number of employees in the industry cluster in a region. No multiplier effects are included. Rankings are for the 50 largest metropolitan statistical areas (MSAs). Employment concentration rank based on the direct cluster employment in a region expressed as a percent of total employment in all industries in the same region. 1st = highest for both rankings.

Major Pharmaceuticals and Biotechnology Companies (top 10 based on employment size)

- Agilent Technologies
www.agilent.com
- Array BioPharma Inc.
www.arraybiopharma.com
- Colorado Serum Company
www.thepeakofquality.com
- Colorado State University Natural Resource Ecology Laboratory
www.nrel.colostate.edu
- CordenPharma Colorado Inc.
www.cordenpharma.com
- Heska Corporation
www.heska.com
- Sandoz, Inc.
www.sandoz.com
- TOLMAR, Inc.
www.tolmar.com
- USGS Fort Collins Science Center
www.fort.usgs.gov
- University of Colorado Cancer Center (formerly AMC Cancer Research)
www.cudenver.edu

2017 Industry Highlights

Bioscience Research and Innovation Assets

The \$5.4 billion, 578-acre Fitzsimons campus includes the adjacent Anschutz Medical Campus and the Fitzsimons Innovation Campus. More than six million square feet of corporate and bioresearch facility space are being developed, combining education, research, innovation, and patient care. Located just 20 minutes from Denver International Airport (DEN) and downtown Denver, the Fitzsimons campus offers an unrivaled range of opportunity from incubator and accelerator space to pre-built laboratories and furnished office or build-to-suit space that can accommodate companies of all sizes, from small start-ups to established industry leaders.

The Anschutz Medical Campus is the largest academic health center between Chicago to the West Coast. The site, which currently employs more than 21,000, receives more than \$400 million in sponsored research awards annually. The Campus is home to top-ranked hospitals and facilities including the University of Colorado Hospital; Children's Hospital Colorado; University Physicians, Inc.; the Schools of Medicine, Nursing, Dental Medicine, Pharmacy, and Public Health; and several other centers for healthcare, biomedical research, and life sciences.

Northern Colorado supports the region's bioscience hub through the efforts of Colorado State University (CSU), the University of Colorado Health (UCHealth), the Innosphere, the Research Innovation Center (RIC), and public and private enterprises. UCHealth has increased its capacity for clinical trials for national and local bioscience companies and has developed its own innovation capacity for surgical techniques and advancements in cancer treatment for animals. A partner to the RIC, Innosphere is an incubator formed to accelerate the success of high-impact scientific and technology companies, and to promote the development of a regional, entrepreneurial ecosystem in Colorado. Innosphere has satellite locations in Fort Collins, Denver, and Boulder to better serve entrepreneurs.

INNOSPHERE			
\$220M	\$63M	1,400+	52
capital raised	revenue generated	CO jobs created	graduate companies

Key Company Expansions

Medical Devices and Diagnostics

- **ChromaDex**, a California-based natural products company, expanded to a 10,000-square-foot facility in Longmont after outgrowing its Boulder operation. Seven employees from Boulder moved to the new location, and 30-40 positions will be added over the next five to seven years.
- **Hach Co.** opened its new \$25 million, 90,000-square-foot expansion in Loveland. The two-story building will house an advanced R&D workspace, and testing and research labs.
- **Mikron Automation**, a manufacturer of products for pharmaceuticals, medical, automotive, consumer, electrical, and construction uses, will again expand its U.S. headquarters. Located in Arapahoe County, the company will add an additional 19,000 square feet of industrial space at its existing facility.

- California-based **Viveve Medical** relocated its headquarters to Douglas County with plans to create 132 new jobs. Viveve cited Colorado's attractive quality of life, educated workforce, and strong economy as factors in its location decision.
- **Zimmer Biomet** located its 101,000-square-foot headquarters in Westminster's Westmoor office park. The location will blend R&D, marketing, and administrative functions. The company is the sixth-largest supplier of spinal surgery tools and implants globally.

Pharmaceuticals and Biotechnology

- **Agilent Technologies** broke ground on its new \$120 million manufacturing facility in Frederick. Upon completion, employment will ramp up starting in February 2018 to an estimated 150 to 200 employees at the 130,000-square-foot facility.
- Longmont-based **Avista Pharma Solutions Inc.** expanded the types and number of new dosage forms of drugs it can manufacture, following the completion of upgrades at its plant. The 20,000-square-foot expansion includes four new processing suites and manufacturing support areas.
- **KBI Biopharma** completed a \$30 million expansion of its Boulder manufacturing facility and will hire over 20 workers. The expansion will support increased production of low-dose microbial products.
- **Peak Serum** moved its operations from Fort Collins to a 3,000-square-foot facility in Wellington. The facility will allow Peak Serum to maximize efficiency and product flow.
- **Tolmar Inc.** is expanding its Northern Colorado operations with a 225,000-square-foot manufacturing and administrative site in Windsor. The Fort Collins-based pharmaceutical company makes drugs targeting prostate cancer and for dermatology.

Agricultural Biotechnology

- **Agrium Inc.** opened its new four-story, 120,000-square-foot facility in Loveland. The facility will house its national corporate and wholesale office employees that were previously scattered across the Denver Tech Center and assorted buildings in the Rangeview office complex.
- Agri-tech company **Inocucor Corporation** opened its 30,000-square-foot U.S. headquarters and commercialization office in Centennial. The company plans to add 50 workers in both its Montreal and Denver operations over the next 18 months.
- Boulder-based **PanTheryx Inc.** acquired two U.S. producers of bovine colostrum to consolidate its supply chain. The deal expanded PanTheryx's employee base from 25 to 175.

Academic and Education Announcements

- **University of Colorado Boulder's (CU Boulder) BioFrontiers Institute** opened its newest education and research wing. The \$32 million, 56,000-square-foot expansion is part of the Jennie Smoly Caruthers Biotechnology Building that features space for biotechnology startups and businesses to co-locate.
- **Colorado State University (CSU)** opened two new science buildings that will anchor the growing CSU Science Commons. The \$58 million, four-story building includes space for teaching and research activities. The \$41 million, 60,000-square-foot chemistry building includes 11 faculty labs and research space.
- CSU launched the new \$65 million C. Wayne McIlwraith Translational Medicine Institute. The Institute will provide regenerative medical therapies for animals and humans, including patient-derived stem cells, to treat musculoskeletal disease and other ailments.

Licensing and Partnership Agreements

- **AntriaBio Inc.** licensed **ActiveSite Pharmaceuticals'** oral plasma kallikrein inhibitor portfolio to treat vision loss in adults. The portfolio will be used for targeting the treatment of diabetic macular edema and other plasma kallikrein-mediated diseases.
- Boulder-based **ArcherDX** announced a partnership with China-based **HeliTec** to advance cancer diagnostic development in China. The partnership will entail co-developing and cross-licensing technologies with the goal of registering oncology diagnostic kits with the Chinese Food and Drug Administration.
- Boulder-based **Array BioPharma Inc.** partnered with California-based **Amgen Inc.** to develop drugs for autoimmune disorders. Amgen will be responsible for commercialization of the drug, while Array will contribute its expertise in chemistry and early-lead development.
- Array BioPharma collaborated with **Merck** to conduct a clinical trial involving therapies from both companies to treat patients with metastatic colorectal cancer. The Merck-sponsored trial will establish dosing for the combined treatment.

- Louisville-based **JustRight Surgical** partnered with California-based **Intuitive Surgical** to expand its use of JustRight technology beyond the pediatric market and drive growth. The agreement will allow the technology to be incorporated into versions of the robotic laparoscopic devices Intuitive sells around the world.
- Boulder-based **Biodesix, Inc.** and Israel-based **Progenetics LTD** entered into an international agreement where Progenetics will market and distribute kits for Biodesix's GeneStrat® and VeriStrat® liquid biopsy tests for patients with non-small cell lung cancer. Both tests are now available for clinical use in Israel.
- Boulder-based **Clovis Oncology Inc.** partnered with **Bristol-Myers Squibb Co.** to test the combination of Clovis' Rubraca drug with Bristol-Myers Obdivo immunotherapy in ovarian and breast cancer drug trials. The collaboration could create new treatment options for patients with multiple tumor types.
- **miRagen Therapeutics** and Paris-based **Servier** extended their collaboration for the R&D and commercialization of microRNA-targeting therapeutics. The regenerative therapies will treat cardiovascular disease and other vascular flow related diseases.
- Golden-based **PharmaJet** partnered with **Serum Institute of India**, the world's largest vaccine manufacturer, to commercialize needle-free delivery of the measles, mumps, and rubella vaccine.

Innovative Technologies and Regulatory Approvals

- Boulder-based **AmideBio, LLC** was granted a European patent for its foundational peptide production platform technology. The issuance is an important milestone to broadly commercialize the company's core platform technology.
- Westminster-based **ARCA biopharma, Inc.** received a patent from the European Patent Office for treating cardiovascular disease and conditions with a new chemical formulation based on genetic targeting. The patent was validated in 10 countries.
- miRagen Therapeutics, Inc. was granted orphan-drug designation from the FDA for its MRG-106 product to treat mycosis fungoides, the most common form of a type of blood cancer.
- Peak Serum received approval to export its fetal bovine serum to the European Union. The serum is used as a medium to culture cells in the biotechnology industry.
- **Silvergate Pharmaceuticals, Inc.** received FDA approval for its XATMEP™ Oral Solution. The Solution treats pediatric patients with acute lymphoblastic leukemia and polyarticular juvenile idiopathic arthritis.
- Fort Collins-based **VetDC** began selling its Tanovea-CA1 drug to treat lymphoma in dogs to licensed veterinarians in the U.S. The drug is a significant breakthrough in the rapidly evolving field of veterinary oncology.

Venture Capital and Funding Awards (listed by investment size)

- Boulder-based **SomaLogic** used a \$162 million investment to commercialize its complete diagnostic exam, SomaScan. The exam creates a complete-health diagnostic test using data from more than 125,000 blood samples used to identify between 40 and 50 diseases.
- Boulder-based **Muse Biotechnology Inc.** raised \$23 million in Series B financing. The company will use the funding to advance its Bio's ForgeCraft™ technology that allows for precision editing of the human genome.
- Westminster-based **Cerapedics** received a \$20 million loan to continue its development and commercialization of a bone graft peptide used in the treatment of orthopedic injuries. The company's technology aims for safer and more predictable bone formation compared to commercially available products.
- Biodesix Inc. sold nearly \$13.2 million in equity. The company develops and manufactures blood-test kits for cancer diagnostics.
- AntriaBio Inc. closed a \$13 million private placement transaction to conduct Phase I clinical trials of its injectable basal insulin for patients with type 1 and type 2 diabetes.
- **Surefire Medical** raised \$12.8 million in Series D financing to expand sales efforts in the U.S., Europe, and China, and for clinical trials. The Westminster company makes drug delivery catheters used to treat liver cancer.
- Boulder-based **Endoshape** raised \$10.5 million in equity financing. The medical device maker develops minimally invasive plugs and coils for occluding blood vessels.
- Eye disorders biopharma **Ocugen** raised \$7.5 million in a Series B round of fundraising to support development of its clinical and preclinical pipeline of treatments for sight-threatening diseases.

- University of Colorado Anschutz Medical Campus startup **Taiga Biotechnologies** raised \$6 million for its pursuit of stem-cell therapies used to treat cancer, HIV, and other diseases.
- Westminster-based **CardioNXT** raised \$2.1 million to perform clinical trials of its technology used to understand complex cardiac arrhythmias including atrial fibrillation, and deliver targeted therapy to affected areas within the heart.
- **MBC Pharma Inc.** received a \$2 million Phase II Small Business Innovation Research (SBIR) grant from the U.S. National Institutes of Health to use and test drug combination in spontaneous canine osteosarcoma.
- **Front Range Biosciences Inc.** raised \$1.5 million in funding from five venture-capital firms. The Lafayette-based startup was founded in 2015 to provide advanced breeding and tissue culture propagation for disease and mold resistant plant applications.

Mergers and Acquisitions

- **CordenPharma International GmbH** acquired the **Hospira Boulder** manufacturing plant from New York-based **Pfizer Inc.**, to be renamed **CordenPharma Boulder**. The agreement will further strengthen CordenPharma's leading position as a premier supplier of highly potent and oncology active pharmaceutical ingredients.
- miRagen Therapeutics Inc. merged with California-based **Signal Genetics** and raised \$40.7 million in private equity financing to advance its clinical programs into additional trials and to target specific populations with few clinical options. Following the merger, the company went public.
- Boulder-based **Nivalis Therapeutics** was acquired by Seattle-based **Alpine Immune Systems**, with the combined company to become publicly traded and fund new immunotherapy cancer and inflammatory disease treatments.
- Loveland-based **Loveland Products** acquired **Starpharma's Priostar** agrochemical business. The acquisition will bring technologies that can be used across Loveland Products' broad base of crop-protection and specialty nutrition products.
- **Church & Dwight Co. Inc.** plans to acquire Fort Collins-based **WaterPik Inc.** for \$1 billion. Church & Dwight is known for its Arm & Hammer products.
- Crop-nutrient producer Agrium merged with **Potash Corp. of Saskatchewan Inc.** The new company will be named **Nutrien**.
- Arapahoe County-based **MD MedTech LLC** merged with Pittsburgh-based **Multi Vendor Service** and Tulsa-based **Wetsco** to form **Innovatus Imaging**. The new company will keep MD Medtech's medical ultrasound design and manufacturing operations in the region.
- Hangzhou-based **Peaceful Union** acquired Aurora-based **Sharklet Technologies Inc.** The acquisition will help the company to accelerate the development of its proprietary bacterial-inhibiting medical device coating and enhance its wound dressing technology.
- Highlands Ranch-based **Sandhill Scientific** merged with **Medovations Inc.** to create **Diversatek Healthcare** that will be based in Milwaukee. Sandhill develops and markets gastrointestinal diagnostic and monitoring products and the Highlands Ranch location will be home to Diversatek's technical training and research center.

Industry Infrastructure Support

Industry Partners



The Colorado BioScience Association (CBSA) serves as the hub of Colorado's thriving bioscience sector by connecting innovators to funding, infrastructure, research, and talent. From promising young companies to established corporations and institutions, CBSA provides opportunities for networking, education, and professional development. CBSA grows the bioscience workforce and leads business expansion policies to advance the industry in the state.



The Northern Colorado Bioscience Cluster (NoCoBio) formed through a partnership with the City of Fort Collins, CSU, CSU Ventures, UCHealth, the Colorado BioScience Association, and Innosphere to help advance bioscience in the region. NoCoBio brings together the region's scientists, physicians, leading innovators, and executive advisors who are working together inside world-class research and business incubator environments in order to maximize the impact on Northern Colorado resources.



Education & Research Institutions

CU Boulder – Colorado BioFrontiers Institute

- Sponsored Research Funding – \$8.5M (\$507.9M university-wide)
- Access to core facilities
- Four primary interdisciplinary research areas: Large Datasets and Genomics; Bioimaging: From Molecules to Organisms; New Therapeutic Paradigms; Regenerative Biology

Colorado State University

- Sponsored Research Funding – \$338.4M (university-wide)
- Institute for Biologic Translational Therapies (\$65M Gift)
- Seed Laboratory and Animal Reproduction and Biotechnology Laboratory
- Flint Animal Cancer Center – international recognized leader in clinical veterinary oncology and cancer research

University of Colorado Anschutz Medical Campus

- Sponsored Research Funding – \$490.6M (university-wide)
- Schools of Medicine, Pharmacy, Nursing, Dentistry, Public Health
- Hospitals – UCHealth, Children’s Hospital Colorado, Veteran’s Administration
- Marcus Institute for Brain Health (\$38M Gift)
- Centers for Personalized Medicine & Biomedical Informatics (\$63M Gift)
- Colorado Clinical & Translational Sciences Institute
- Charles C. Gates Center for Regenerative Medicine
- Webb-Waring Center
- Gates BioManufacturing Center
- StartUp Health Colorado

Other Major Research Assets

- Fort Collins is home to the Centers for Disease Control and Prevention’s National Center for Emerging and Zoonotic Infectious Diseases Division of Vector-Borne Diseases. The Division is a national and international leader in researching, preventing, and controlling viruses and bacteria, spread by vectors such as mosquitoes, ticks, and fleas.

Incubators & Accelerators

- Bioscience Park Center – 215,000 square feet including R&D, office, education, and lab space adjacent to the Anschutz Medical Campus.
- Innosphere – High-tech incubator in Denver, Boulder, and Fort Collins supporting entrepreneurs building high-growth companies in health innovation, life sciences, software and hardware, energy, and advanced materials. Innosphere is implementing a \$20.5 million metro-area expansion with plans for a new 50,000-square-foot startup incubator in Denver and the addition of 7,000 square feet to its headquarters in Fort Collins. The new location is expected to open in 2020.
- The Colorado Institute for Drug, Device and Diagnostic Development (CID4) accelerates life science discoveries and bridges the gap between research and successful product developments. CID4 serves universities, bioscience companies, academic groups, and professional associations by providing seed funding, active management, investor connections, and strategic consulting. As of 2016, CID4 invested more than \$2 million in nine portfolio companies.
- Boomtown is the design focused technology accelerator located in Boulder focused on media, IoT, B2B, ad-tech, and health tech. The curriculum is customized to the needs of the individual startup, supporting and educating entrepreneurs.
- Research Innovation Center – Hub for university scientists and students to partner with business to develop new products to treat and diagnose infectious diseases.
- Catalyst HTI – A health-tech industry integration project slated to open in 2018 in Denver’s River North neighborhood that will integrate building space for startups, *Fortune* 500 companies, and healthcare providers in one location. The first-of-its-kind project will enable startups with resources to grow and expose providers and larger companies to emerging technologies and human capital.

Venture Capital & Funding Mechanisms

- The Colorado Office of Economic Development and International Trade (OEDIT) awarded its fifth round of grants for the Advanced Industries Accelerator Programs in 2017. The programs support key industries in Colorado, including bioscience and medical device manufacturers, by providing up to \$150,000 for Proof-of-Concept grants, up to \$250,000 for Early-Stage Capital grants, and \$15,000 matching grants for businesses looking to export to global markets.
- The Blackstone Entrepreneurs Network is designed to help entrepreneurs find resources and thrive in Colorado. The network has a variety of business advisors in fields for entrepreneurship, technology, biotechnology, and health technology industries.
- The Colorado Venture Capital Authority (VCA) provides seed and early-stage capital investments in Colorado companies with the potential for rapidly scaling their businesses. The managing partner, High Country Venture, reviews funding deals and makes investments in selected businesses by using debt, equity, or debt with a conversion option into equity. VCA also established Colorado Fund I and II, each with approximately \$25 million.
- Colorado PERA's Colorado Mile High Fund is a \$50 million co-investment program designed to invest in a diversified, high-quality portfolio of companies with a nexus to Colorado. With an established bioscience industry, strong growth opportunities, a dedicated research community, and an active private equity market, the nine-county region is poised for investment.
- The Boettcher Foundation's Webb-Waring Biomedical Research Awards provides biomedical research funding for early career investigators at Colorado's research institutions. Recipients of the awards receive research grants of \$235,000, covering up to three years of biomedical research.



Incentives and Resources

- **Cleanroom Sales & Use Tax Exemption Colorado** provides an exemption from state sales and use tax paid on the purchase of machinery that comprises a cleanroom from July 1, 2007 to July 1, 2017.
- **Advanced Industry Workforce Development** provides companies a reimbursement for expenses related to hiring an intern or apprentice.
- **Biotechnology Sales and Use Tax Refund** was created for Colorado taxpayers to refund state sales and use taxes paid on purchases of tangible personal property used directly in biotechnology R&D.
- **Manufacturing Sales & Use Tax Exemption** excludes state sales and use tax paid on the purchases of manufacturing machinery and machine tools and parts.
- **The Job Growth Incentive Tax Credit** allows companies to apply to the Colorado Economic Development Commission for a state income tax credit based on the payroll tax cost from creating jobs. To qualify, companies must create at least 20 new jobs in the region and pay wages above the local average.
- **The Strategic Fund Incentive** program is a performance-based grant for the creation of net new jobs in Colorado that meet certain requirements. The program supports and encourages new business development, business expansions, and relocations that have generated new jobs throughout the state. The Strategic Cash Fund also provides support for initiatives pertaining to key industries or regional development.
- **Colorado's Enterprise Zone (EZ)** program provides tax incentives to encourage businesses to locate and expand in designated economically distressed areas of the state.
- **The Colorado First and Existing Industry** grants are jointly administered by OEDIT and the Colorado Community College System. The state may be able to provide specific support to retain jobs or offers business-friendly tools that assist in retaining jobs (such as the Enterprise Zone Program) for this grant.
- **The Advanced Industry Investment Income Tax Credit** allows investors to receive tax credits for investing in early-stage, advanced industry companies. Investors can claim tax credits worth 25 percent of their investment in the company if they do not own more than 30 percent of the business before the investment was made or 50 percent after, up to a maximum of \$50,000 in tax credits.

Cross-Cluster Convergence

The region is a leader in the development of Big Data and software technologies for the advancement of healthcare and life sciences. The synergy between bioscience, healthcare, and software supports the nine-county region as a national leader in expanding digital health—the convergence of the digital and genetics revolutions with bioscience, healthcare and wellness, and information technology-software. Other digital health companies including Prima-Temp, RxREVU, Welltok, iTriage, RxAssurance, and Cerescan are developing advanced technologies to improve health.

Digital Health

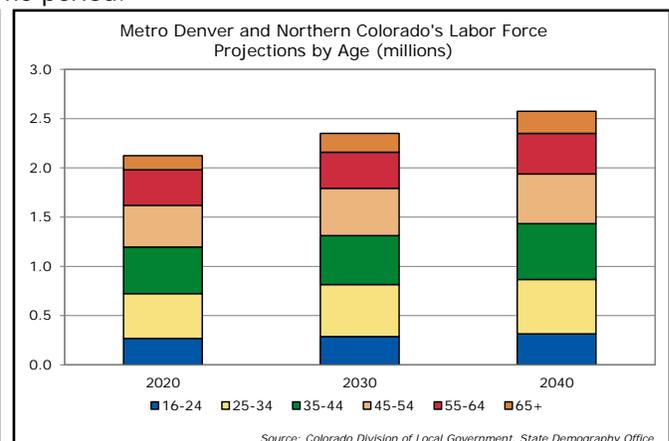
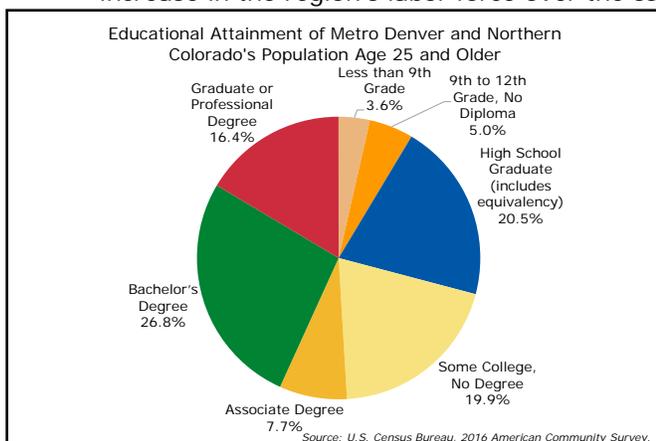
- Founded in July 2012 by the Denver South Economic Development Partnership and Innovation Pavilion, **Prime Health** is a growing statewide community of 1,600+ health care executives, physicians, technologists, academics, entrepreneurs, and investors dedicated to improving health and lowering healthcare costs through the commercialization of digital health technologies. Colorado is home to more than 130 digital health companies.
- **StartUp Health Colorado** launched to create a health innovation hub in the Rocky Mountain region. The organization partnered with Children’s Hospital Colorado, UCHealth, and the University of Colorado to streamline the pathways for health entrepreneurs to innovate and grow.

Big Data & Technologies

- Denver-based **RxRevu** developed a prescription decision-support tool that uses Big Data and artificial intelligence to improve the consistency, safety, and efficiency of the drug prescribing process. RxCheck uses “smart data” from a patient’s clinical histories to inform the provider about appropriate prescribing options.
- **CU Boulder’s Computational Bioscience** program provides computational approaches to health problems from the molecular level to the population level. Programs at the BioFrontiers Institute and the Department of Computer Science are developing novel computational and statistical techniques for understanding data from complex biological and social systems.
- CSU invested \$15 million in active research projects applying Big Data, artificial intelligence, and bioinformatics to computational problems in protein and RNA function and interactions, alternative splicing, genomics and transcriptomics, genome sequencing and resequencing, and detection of transcription regulatory elements.
- Boulder-based fertility app developer **Kindara** partnered with **Helix**, a personal genetics company, to help women who are pregnant or trying to become pregnant have healthier pregnancies by accessing their DNA information. The goal is an at-home DNA test that will sync with Kindara’s fertility app to provide insights into nutrition, wellness, and fitness.

Nine-County Region Workforce

- Nearly half of the nine-county region’s 3.8 million residents are under the age of 35. Employers can draw from a large, young, highly educated, and productive workforce.
- Of the region’s adult population, 43.2 percent are college graduates and 91.4 percent have graduated from high school.
- The region’s population is expected to grow 32.2 percent from 2020 to 2040, driving a 21.2 percent increase in the region’s labor force over the same period.

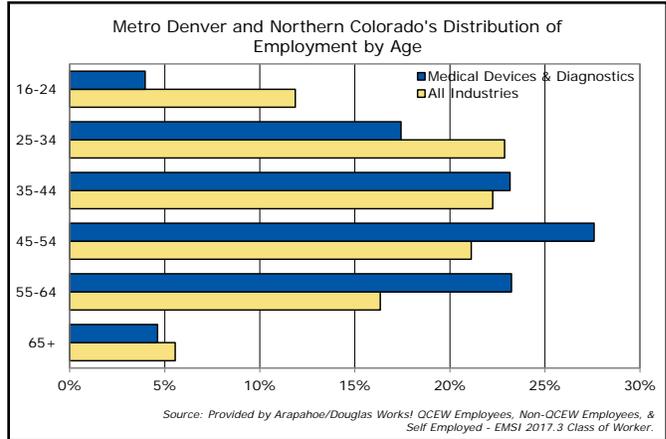


Bioscience Workforce Profile

Medical Devices and Diagnostics

The subcluster has a larger share of employees that are between the ages of 45 and 64 years old (50.8 percent), compared with the age distribution of all industries across the nine-county region (37.5 percent).

The Occupation & Salary Profile below includes the 10 largest medical devices and diagnostics occupations in the region. For these 10 largest occupations, the chart details the total number of workers employed in that occupation across all industries, the number of available applicants that would like to be working in that occupation, the number of recent graduates that are qualified for that occupation, and the median and sample percentile annual salaries.



Wages

- 2016 average annual salary was \$76,940, compared with \$84,710 nationwide.
- Total payroll was nearly \$858 million in 2016, an increase of 3.7 percent over-the-year.

Metro Denver & Northern Colorado Medical Devices & Diagnostics Occupation & Salary Profile, 2017

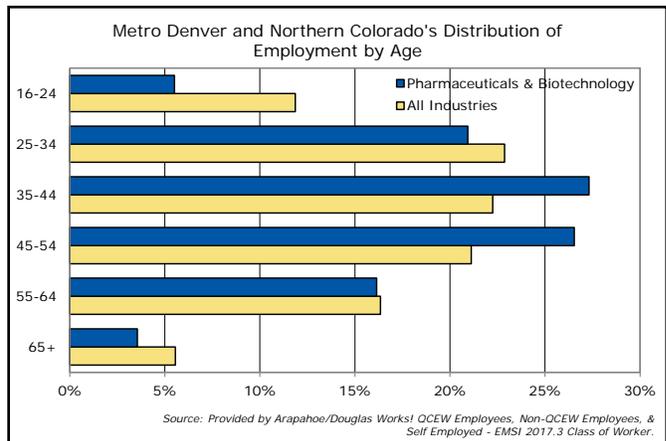
10 Largest Medical Devices and Diagnostics Occupations in Metro Denver and Northern Colorado	Total Working Across All Industries (2017)	Number of Available Applicants (2017)	Number of Graduates (2016)	Median Salary	10th Percentile Salary	25th Percentile Salary	75th Percentile Salary	90th Percentile Salary
1. Electrical & electronic equipment assemblers	2,753	67	0	\$34,581	\$20,490	\$25,707	\$44,967	\$56,246
2. Dental laboratory technicians	523	13	0	\$41,539	\$23,444	\$29,992	\$58,924	\$69,735
3. Electromechanical equipment assemblers	1,718	42	0	\$32,963	\$23,038	\$27,033	\$41,339	\$49,718
4. Team assemblers	3,398	83	0	\$31,334	\$20,568	\$24,640	\$39,558	\$49,808
5. Industrial engineers	2,712	66	4	\$91,768	\$57,427	\$71,203	\$115,725	\$140,154
6. Software developers, systems software	11,131	271	1,191	\$112,619	\$77,723	\$91,555	\$137,778	\$170,634
7. Electronics engineers, except computer	4,976	121	398	\$94,837	\$65,034	\$75,581	\$122,715	\$152,011
8. Inspectors, testers, sorters, samplers, & weighers	3,894	95	0	\$39,714	\$20,971	\$28,912	\$51,747	\$66,404
9. General & operations managers	31,749	772	5,578	\$115,241	\$47,968	\$72,558	\$179,035	\$261,240
10. First-line supervisors of production & operating workers	4,881	119	0	\$61,170	\$36,756	\$45,986	\$78,604	\$98,736

Notes: The number of available applicants is a point-in-time measurement of the number of people who have registered in Colorado's workforce development system's statewide database, Connecting Colorado, as being able and available to work in a particular occupation. Results should be interpreted with caution since registration in Connecting Colorado is self-reported. In addition, the skills rubric may assign up to four occupation codes for each registrant. Therefore, the number of available applicants could be inflated. Source: Provided by Arapahoe/Douglas Works!; QCEW Employees, Non-QCEW Employees, & Self Employed - EMSI 2017.3 Class of Worker.

Pharmaceuticals and Biotechnology Workforce Profile

The subcluster has a larger share of employees that are between the ages of 35 and 54 years old (53.9 percent), compared with the age distribution of all industries across the nine-county region (43.4 percent).

The Occupation & Salary Profile below includes the 10 largest pharmaceuticals and biotechnology occupations in the region. For these 10 largest occupations, the chart details the total number of workers employed in that occupation across all industries, the number of available applicants that would like to be working in that occupation, the number of recent graduates that are qualified for that occupation, and the median and sample percentile annual salaries.



Wages

- 2016 average annual salary was \$94,850, compared with \$128,130 nationwide.
- Total payroll reached nearly \$442 million in 2016.

Metro Denver and Northern Colorado Pharmaceuticals and Biotechnology Occupation & Salary Profile, 2017

10 Largest Pharmaceuticals and Biotechnology Occupations in Metro Denver and Northern Colorado	Total Working Across All Industries (2017)	Number of Available Applicants (2017)	Number of Graduates (2016)	Median Salary	10th Percentile Salary	25th Percentile Salary	75th Percentile Salary	90th Percentile Salary
1. Chemists	1,607	39	235	\$76,043	\$38,715	\$51,803	\$107,849	\$128,086
2. Biological technicians	2,545	62	0	\$45,003	\$29,471	\$34,820	\$58,113	\$70,875
3. Packaging & filling machine operators & tenders	4,636	113	0	\$29,679	\$20,181	\$23,639	\$41,743	\$52,712
4. Business operations specialists, all other	32,514	791	17	\$74,757	\$43,128	\$55,758	\$98,542	\$126,087
5. Chemical equipment operators & tenders	667	16	0	\$34,973	\$24,188	\$28,571	\$43,514	\$54,574
6. Managers, all other	11,723	285	6,021	\$71,462	\$31,691	\$36,510	\$127,018	\$171,930
7. Natural sciences managers	1,241	30	3,095	\$127,874	\$85,961	\$103,827	\$160,947	\$241,396
8. Inspectors, testers, sorters, samplers, & weighers	3,894	95	0	\$39,714	\$20,971	\$28,912	\$51,747	\$66,404
9. Chemical technicians	808	20	0	\$42,121	\$21,295	\$32,668	\$53,481	\$66,410
10. First-line supervisors of production & operating workers	4,881	119	0	\$61,170	\$36,756	\$45,986	\$78,604	\$98,736

Notes: The number of available applicants is a point-in-time measurement of the number of people who have registered in Colorado's workforce development system's statewide database, Connecting Colorado, as being able and available to work in a particular occupation. Results should be interpreted with caution since registration in Connecting Colorado is self-reported. In addition, the skills rubric may assign up to four occupation codes for each registrant. Therefore, the number of available applicants could be inflated. Source: Provided by Arapahoe/Douglas Works!; OCEW Employees, Non-OCEW Employees, & Self Employed - EMSI 2017.3 Class of Worker.

Education & Training

Colorado's higher education system provides an excellent support system for businesses in the region. There are 28 public higher education institutions in Colorado, of which seven four-year and six two-year public institutions offering comprehensive curricula are located in the nine-county region. There are more than 100 private and religious accredited institutions and more than 350 private occupational and technical schools offering courses in dozens of program areas throughout the state. The state higher education system served about 255,510 students in FY 2015-16, while 86,070 students received a degree, diploma, certificate, or other formal award over the same period of time. Although not exhaustive, a list of the major, accredited educational institutions with the greatest number of graduates for each of the 10 largest bioscience

occupations in the nine-county region are included below. A directory of all higher education institutions with corresponding websites may be accessed via <http://higherred.colorado.gov>.

- Colorado School of Mines www.mines.edu
- Colorado State University www.colostate.edu
- Colorado State University Global Campus www.colostate.edu
- Front Range Community College www.frontrange.edu
- Metropolitan State University of Denver www.msudenver.edu
- Red Rocks Community College www.rrcc.edu
- Regis University www.regis.edu
- University of Colorado Anschutz Medical Campus www.ucdenver.edu
- University of Colorado Boulder www.colorado.edu
- University of Colorado Denver www.ucdenver.edu
- University of Denver www.du.edu
- University of Northern Colorado www.unco.edu

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 and entrepreneurial talent

- Colorado is home to four, top-ranked university bioscience programs at the University of Colorado Boulder (CU Boulder), Colorado State University (CSU), the University of Colorado Denver, and the University of Denver. (*U.S. News & World Report*, 2017)
- Colorado ranked ninth for the number of science, engineering, and health graduate students per 1,000 individuals ages 25 to 34 years old. (National Science Foundation, 2017)
- Established in 2014, the U.S. Department of Commerce United States Patent and Trademark Rocky Mountain Regional Office in Denver expedites patent examination in the region, advances cutting-edge ideas to the marketplace, empowers entrepreneurs, and creates new highly-skilled jobs. (U.S. Patent and Trademark Office, 2017)
- Denver ranked 11th among the nation's top biopharmaceutical clusters, and ranked No. 9 in laboratory space (4 million square feet) and No. 10 in employment. (*Genetic Engineering and Biotechnology News*, 2017)
- Denver ranked 14th in the nation in life sciences employment, number of establishments, and funding availability. (Jones Lang LaSalle, 2017)
- Colorado ranked fourth for the total number of National Institute of General Medical Sciences Maximizing Investigators' Research Awards in 2016, which increase productivity and the chances for important breakthroughs for investigators. (National Institutes of Health, 2017)
- Denver ranked as the eighth-best market for entrepreneurs in 2017. (American City Business Journals, 2017)

Denver ranked 11th among the nation's top biopharmaceutical clusters.

—*Genetic Engineering & Biotechnology News*, 2017

2. Affordable operating costs

Denver had the third-lowest rent for life sciences laboratory space.

—*Jones Lang LaSalle*, 2017

- Denver had the third-lowest average rent for life sciences laboratory space at \$14.83 per square foot, compared with other major bioscience markets. (Jones Lang LaSalle, 2017).
- Bioscience companies can recruit affordable, productive employees as the nine-county average wage for bioscience workers is slightly below the national average. (Development Research Partners, 2017)
- The nine-county region offers a variety of real estate opportunities for

bioscience companies, ranging from fully furnished executive suites to build-to-suit laboratories and office space.

3. A pro-business environment and competitive tax structure

- Colorado ranks as one of the nation's most favorable corporate income tax structures. The state's corporate income tax rate of 4.63 percent is one of the lowest in the nation and is based on single-factor apportionment, which allows companies to pay taxes based solely on their sales in the state. (State of Colorado; The Tax Foundation)
- Colorado ranks as the nation's 10th-best tax system for entrepreneurs and small business. (Small Business & Entrepreneurship Council, 2017)
- Metro Denver ranked fourth among *Forbes'* 2017 "Best Places for Business and Careers." The Fort Collins metro area ranked 17th, Colorado Springs ranked 18th, Boulder ranked 45th, and Greeley ranked 51st. (*Forbes*, 2017)
- Colorado received an "A" grade for its business-friendly environment in 2017 and ranked seventh for ease of starting a business. Denver received a "B+" grade for overall friendliness. (Thumbtack.com, 2017; Ewing Marion Kauffman Foundation, 2017)

4. Access to financial resources to fund research and development

- Denver life sciences companies received \$58.8 million in venture capital funding in 2016, representing 0.6 percent of total U.S. life sciences funding. (Jones Lang LaSalle, 2017)
- Colorado ranked third for life science-related venture capital investments in 2017, totaling \$519 million. (PricewaterhouseCoopers, 2017)
- Colorado bioscience companies have received \$1 billion in venture capital investments since 2012 with three segments receiving more than \$200 million each—human biotechnology, biofuels, and health information technology. (Biotechnology Innovation Organization, 2017)
- Colorado offers several public and private sources of business funding including the Certified Capital Companies Program, the Venture Capital Authority, and Colorado Capital Access. (Contact the Colorado Office of Economic Development and International Trade for more information.)
- The nine-county region has six venture firms currently investing in bioscience: Boulder Ventures, Lightstone Ventures, Morgenthaler Ventures, Stakeholder Ventures, Tango/HCV, and Three Leaf Ventures.
- Colorado ranked fourth in the nation for Small Business Innovation Research (SBIR) grants per worker. The state received \$32.90 in grants per worker compared with the U.S. average of \$13.34. (U.S. Small Business Administration, 2017; U.S. Bureau of Labor Statistics, 2017)
- NIH funding in 2016 totaled a record \$349.5 million in Colorado, increasing 9.3 percent since 2011. The University of Colorado ranked among the nation's top-25 institutions in total NIH funding in 2016. (National Institutes of Health, 2017)

Colorado ranked fourth in the nation for SBIR grants per worker.

—U.S. Small Business Administration, 2017

5. Business organizations and public policy programs designed to encourage industry growth

- The Advanced Industries Accelerator Programs include four types of grants and a global business support program to promote growth and sustainability in Colorado's advanced industries, including bioscience, among others. The program has awarded over \$40 million in grants since its inception in 2013. (Colorado Office of Economic Development and International Trade, 2017)
- The Colorado Innovation Network is a catalyst for economic prosperity through innovation by partnering with government, business, and civil society to foster collaboration around global ideas, talent, capital, and the entrepreneurial spirit.

For additional information, contact us:



Metro Denver
Economic Development Corporation

1445 Market Street
Denver, CO 80202-1790
303.620.8092
email: info@metrodenv.org
www.metrodenver.org

Prepared by Development Research Partners, Inc., www.DevelopmentResearch.net