



Colorado

Programs & Initiatives Advancing the Biopharmaceutical Industry



Key Programs & Initiatives

The opportunities generated by the biopharmaceutical sector as a leader in innovation and high quality job creation are not limited to just a few states, but have a substantial national footprint. States proactively pursue the development of the biopharmaceutical sector because it represents: a large-scale, geographically dispersed supply chain spanning R&D through to production and distribution; a key driver of the economy including the recent economic recovery; and a sector paying high wage rates in quality jobs. States are deploying a range of programs and initiatives to support and grow the biopharmaceutical industry, including: comprehensive state development strategies; investments in R&D and related infrastructure; programs to boost venture capital, entrepreneurship, and innovation development; advanced manufacturing; economic incentive initiatives; and programs working to advance STEM education and training. Colorado stands out in recent years in advancing biosciences development through the Bioscience Discovery Evaluation Grant, which served as a template for the state's broader Advanced Industries Accelerator Program.

Quick Guide: Colorado's Programs & Initiatives Advancing the Biopharmaceutical Industry



Comprehensive State Strategies to Support Biopharmaceutical Development:

- Advanced Industries Accelerator Program



R&D Investment:

- The Colorado Center for Drug Discovery
- UC's Anschutz Medical Campus Core Facility for High Throughput/content Screening for Drug Discovery
- The BioFrontiers Institute at the University of Colorado Boulder



Biosciences Infrastructure Development:

- Fitzsimons Innovation Campus



Venture Capital, Entrepreneurship, and Other Innovation Related Programs and Initiatives:

- Colorado Institute for Drug, Device and Diagnostic Development
- Proof-of-Concept Grant
- Innovation Center of the Rockies
- Colorado Venture Capital Authority
- Early-Stage Capital & Retention Grants
- Advanced Industry Investment Tax Credit



Advanced Manufacturing:

- BioMARC



Economic Incentives:

- Biotechnology Sales and Use Tax Refund



STEM Workforce & Education:

- Colorado Bioscience Institute
- Colorado STEM Education Roadmap
- STEM Mentor Program

Impacts

- **Colorado Institute for Drug, Device and Diagnostic Development (CID4)** – has 8 early stage companies under its guidance as of early 2015.
- **Proof-of-Concept Grant** – 163 grants were made from 2007-13 involving funding of just under \$10M, which lead to 38 new companies, over \$290M of follow-on capital funding, and 34 licenses issued.
- **Innovation Center of the Rockies** – the Innovation Center has worked with more than 280 research teams to commercialize its technologies, resulting in 19 start-ups that have raised nearly \$106M in new capital and created more than 600 jobs.
- **Colorado Venture Capital Authority** – as of February 2015, 31 emerging companies received investments across the two funds of nearly \$46M, leading to the creation of over 1,200 jobs.

Impacts continued on next page

Colorado by the Numbers



Source: National Science Foundation, Science & Engineering Indicators 2014.

Impacts, continued

- **Early-Stage Capital & Retention Grants** – from 2007-13 assisted 53 companies, providing under \$4.5M and leading to over \$70M in follow-on capital funding.
- **BioMARC** – has brought a diagnostic parenteral product through clinical trial and commercial production, manufactured a virus vaccine for a phase I clinical study, developed and qualified cell based and analytical assays for product testing and release, and established a controlled process for manufacturing a therapeutic product for preclinical studies in non-human primates bridging to a phase I study in humans.

Comprehensive State Strategies to Support Biopharmaceutical Development

Colorado in 2013 adopted a comprehensive economic development strategy to drive innovation, accelerate commercialization, encourage public-private partnerships, increase access to early stage capital and create a strong ecosystem that increases the state's global competitiveness around seven advanced industries, including the biosciences. These advanced industries are the prime drivers of the Colorado economy, accounting for nearly 30 percent of the state's wage earnings, nearly 30 percent of the total sales revenues across all industries within the state, and nearly 35 percent of the state's total exports.

- As part of the statewide strategy to support these critical industries in their various phases of growth, Colorado has standardized a set of programs that target these advanced industries across different stages of technology development through firm formation and growth, known as the **Advanced Industries (AI) Accelerator Program**. This AI Accelerator Program is administered through the Colorado Office of Economic Development and International Trade (OEDIT).

The Colorado Bioscience Association, which represents over 350 bioscience companies in the state, and stands out for its past leadership in setting a statewide bioscience roadmap for Colorado that led to its partnering with the State to create the Bioscience Discovery Evaluation Grant Program that supported research infrastructure, commercialization and funding for emerging and early stage companies and commercialization infrastructure.

- CBA continues its active engagement with economic development for the biosciences, serving as the "lead" for biosciences for the Advanced Industries Accelerator Program, helping to review applications for funding.

R&D Investment Programs and Initiatives

Research Center Core Facility Support. Through the Bioscience Discovery Evaluation Grant Program that is now being integrated into the Advanced Industries Acceleration Program, several important university-related biosciences research centers have been funded in recent years including:

- **The Colorado Center for Drug Discovery (C2D2)** based at Colorado State University offering a shared-use facility for researchers, including chemical libraries, computational resources, bioinformatics, cheminformatics, database support, virtual high throughput screening and computer aided drug design. Plus, C2D2 supports several inter-institutional projects with funding support, and offers compounds to investigators through its screening library and medicinal chemistry services that are critical to the drug discovery process.
- **The Skaggs' School of Pharmacy at the University of Colorado's Anschutz Medical Campus Core Facility for High Throughput/content Screening for Drug Discovery.**
- **The BioFrontiers Institute at the University of Colorado Boulder** is a state-of-the art multi-disciplinary research and education facility focused on breakthroughs in areas such as engineering human tissues, RNA enzyme and aptamer based pharmaceutical, and genetics. The Institute has developed one of the largest repositories of shRNAs in the world at its Functional Genomics Facility. It also has active industry research partnerships and engagements. Nobel Laureate Tom Cech was recruited back to UC Boulder from the Howard Hughes Medical Institute to lead this growing effort.

In the future, funding for cutting-edge shared-use core facilities will be available to the bioscience industry through the Advanced Industries Accelerator Infrastructure Grants that seek to increase the state's capacity to be globally competitive. It will provide preferences for core facilities that involve more than one research institution and have impacts across more than one advanced industry. It will also require matching support of \$3 state to \$1 institution.

Programs and Initiatives to Build Bioscience Infrastructure

Fitzsimons Innovation Campus. Located in Aurora, Colorado, at the site of a former Army Medical Center, this major new 184-acre campus for the University of Colorado Denver and University of Colorado Hospital – now known as the Anschutz Medical Campus of the University of Colorado – also offers a research park for bioscience companies and a live-work-play environment that is emblematic with leading Innovation Districts being developed across the nation.

- A BioBusiness Incubator is housed in the 97,000 square foot Bioscience Park Center, which also offers second stage multi-tenant space for growing bioscience companies.
- A smaller 25,000 sq. ft. wet lab facility is also part of the research park, plus a new 112,000 square foot building is opening in 2015 that will house UC's bioengineering program on its first two floors and industry tenants on the two floors above, offering excellent opportunities for engaging students and faculty.

Venture Capital, Entrepreneurship, and Other Innovation Related Programs and Initiatives

Innovation Development

Colorado Institute for Drug, Device and Diagnostic Development (CID4). Founded in 2009 with funding support from the Bioscience Discovery Evaluation Grant Program, CID4 is a non-profit to advance the Colorado bioscience ecosystem through company creation and job growth. This involves working to identify, fund and actively manage emerging life science technologies, through an ongoing technology solicitation process engaging Colorado universities, researchers and inventors.

- **Outcomes:** CID4 has 8 early stage companies under its guidance as of early 2015.

Proof-of-Concept Grant. Since 2007, Colorado has provided grant funding to validate the commercial potential of research discoveries and technologies and reach critical commercialization milestones.

- **Outcomes:** Under the Bioscience Discovery Evaluation Grant Program, a June 2013 program update to the

legislature by the Office of Economic Development and International Trade, reported that 163 proof-of-concept grants were made from 2007 to 2013 involving funding of just under \$10 million, which lead to 38 new companies formed, over \$290 million of follow-on capital funding, and 34 licenses issued.

Entrepreneurial Development

Innovation Center of the Rockies. Started in 2005, the Innovation Center of the Rockies has become a premier entrepreneurial support organization that works closely with the university technology transfer offices in Boulder and now across the Iron Range region from Denver to Colorado Springs. The Innovation Center brings expert teams of entrepreneurial mentors and advisors together to assess and advance university technology transfer as well as mentor local early stage companies.

- It has developed a database of approximately 1,800 screened and qualified advisors with specific technology domain expertise to support local early stage companies and to inform the commercial assessment of university technology and guide its commercialization approach, including connecting it with investors and management teams.
- To help directly support the commercialization of high potential technologies, the Innovation Center has organized an angel network.
- **Outcomes:** In addition to its critical role in supporting university technology assessments, the Innovation Center has worked with more than 280 research teams to commercialize its technologies, which have resulted in 19 new start-up companies that have generated nearly \$106 million in new capital raised and created so far over 600 jobs.

Venture Financing

Colorado Venture Capital Authority (VCA). The Colorado Venture Capital Authority was established in 2004 to make seed- and early-stage capital investments in businesses. The VCA was allocated \$50 million in premium tax credits, which it subsequently sold to insurance companies. The VCA selected fund manager High Country Venture, LLC, and established Colorado Fund I and Colorado Fund II, each with approximately \$25 million.

- The minimum and maximum investment size generally ranges from \$250,000 to \$3.375 million.
- **Outcomes:** As of February 2015, 31 emerging companies received investments across the two funds of nearly \$46 million, leading to the creation of over 1,200 jobs.
- A sizable share of the investments made have been to bioscience companies from its initial company investment in Taligen Therapeutics in August 2005 to its most recent investment in VetDC, providing anti-cancer agents for pets.

Early-Stage Capital & Retention Grants. Under the Advanced Industry Accelerator Program, grant funding of up to \$250,000 is available for emerging companies in one of the state's targeted seven advanced industries with less than \$10 million in annual revenues and less than \$20 million raised from investors. Preferences are given to those emerging companies developing a technology licensed from a research institution in Colorado, involved in an incubator/accelerator program, referred by a VC/angel investor group or impacting more than one advanced industry. Matching funds of \$2 for every \$1 of state funding is required.

- **Outcomes:** A similar type of early-stage company grant was available under the Bioscience Discovery Evaluation Grant Program that has now been integrated into the Advanced Industry Accelerator Program, which from 2007 to 2013 assisted 53 companies, providing under \$4.5 million and leading to over \$70 million in follow-on capital funding, as reported by OEDIT to the state legislature in a June 30, 2013 report.
- A June 2014 report on the Advanced Industry Accelerator Program noted that there were 19 active early stage capital and retention grants made of which 7 were made to bioscience companies, roughly equal to the annual average made under the earlier Bioscience Discovery Evaluation Grant Program.

Advanced Industry Investment Tax Credit. A tax credit of 25% for capital investments in qualified companies in one of the state's seven advanced industries is available for up to a \$50,000 maximum allowable tax credit amount per investment in a single company. If the qualified company is in a rural or economic distressed area the tax credit is 30%. Investors can apply for separate credits for investments in different companies, and qualified businesses can receive investments from multiple investors that qualify.

- The aggregate amount of credits available each year are subject to an annual statutory limit of \$375,000 in 2014 and \$750,000 from 2015-2017, awarded on a first come, first serve basis once the transaction is completed. The investor must be an individual, S corporation, partnership, LLC or other business entity. C corporations are not eligible to be investors in this program.
- Qualified companies for investment must meet several criteria, including being in one of the state's identified seven advanced industries, having received less than \$10 million from investors since the business was formed, having annual revenues of less than \$5 million and having been in operation for less than 5 years.

Advanced Manufacturing Programs and Initiatives

BioMARC. Owned and operated by Colorado State University, BioMARC is a nonprofit contract manufacturing organization that was created to translate and produce biopharmaceutical products for non-clinical, clinical, and commercial use under Biosafety Level 3 (BSL-3) and BSL-2 containment (including spore former containment) and Select Agent (SA) biosecurity conditions. In addition to manufacturing and testing services, BioMARC offers product and process development services, which includes the creation of development programs focused on implementation of cGMP regulations and scalability issues.

- BioMARC has extensive expertise in developing and optimizing product manufacturing processes and related tests for therapeutic, vaccines, and diagnostic products.
- **Outcomes:** To-date, BioMARC has brought a diagnostic parenteral product through clinical trial and commercial production (including a PAI inspection), manufactured a virus vaccine for a phase I clinical study, developed and qualified cell based and analytical assays for product testing and release, and established a controlled process for manufacturing a therapeutic product for preclinical studies in non-human primates bridging to a phase I study in humans.

Economic Incentives

Biotechnology Sales and Use Tax Refund. Colorado provides a tax refund on sales and use taxes paid on purchases of tangible personal property used directly in research and development of biotechnology. This includes property such as microscopes, chemical reagents and software.

STEM Workforce and Education Programs and Initiatives

Colorado Bioscience Institute. An initiative of the Colorado Biosciences Association, which offers a range of education and workforce programs for teachers, students and working bioscience professionals.

- In science education, the Institute launched in 2014 the Research Experience for Teachers (RET) program, providing middle and high school teachers real-world laboratory experience and helping them translate their research experiences and new knowledge into classroom activities through an intensive program four-week program during the summer.
- The Institute helps students by facilitating internships as well as sponsoring science competitions.
- The Institute also offers professional development and training programs, in concert with universities and training professionals, for those in the biosciences on key topics such as risk management, FDA quality requirements and lean basics, as well as access at discounted rates for members to online courses on bioscience business geared to working scientists.

Colorado STEM Education Roadmap. In 2014, the Colorado Education Initiative (CEI), an independent non-profit that collaborates with the Colorado Department of Education (CDE), released the Colorado STEM Education Roadmap (STEM Roadmap), a state plan for advancing STEM education and experiences for all learners in Colorado that aligns with private sector efforts. The plan focuses on sustaining and advancing STEM education through coordination, alignment, equity, transparency, and evaluation of impact to ensure Colorado develops a local talent pipeline representative of the diversity of Colorado's communities able to meet the needs of an innovation economy.

STEM Mentor Program. The Colorado Education Initiative (CEI) is partnering with companies to increase access to STEM courses for all students – especially girls and minority students who are underrepresented in STEM classes. Through the STEM Mentor Program, industry leaders are mentoring students in Advanced Placement (AP) programs.