

ARIZONA'S
BIOSCIENCE
ROADMAP

THE LATEST PROGRESS OF THE
BIOSCIENCES
IN ARIZONA



ADVANCING THE BIOSCIENCES AND IMPROVING HEALTH OUTCOMES

A Bright Light in the Most Challenging Year

The COVID-19 pandemic has brought forth the best from Arizona's responsive bioscience sector.

Since Arizona's Bioscience Roadmap debuted in 2002, it has been propelled by twin arguments: We invest in bio as a difference-maker for our economy that creates virtually recession-proof, high-paying jobs, while reinforcing growth in other high-technology sectors. And we invest in bio to drive better health outcomes for our state, providing Arizonans easier access to superior diagnostics, treatments, and clinical expertise.

Arizona's pandemic year of 2020 underscored both propositions more dramatically than most of us could have imagined possible.

In some respects, COVID-19 showed how far we have to go. Despite excellent hospital systems, even before the crisis Arizona had too few beds and providers for our population. As admissions soared, clinicians were pushed far beyond what they should have been expected to endure. Disparities in access to care and basic infrastructure also contributed to what became one of the nation's highest per-capita fatality rates, with especially tragic results for tribal communities and neighborhoods of high social vulnerability.

Meanwhile, though, Arizona research teams—including several cited in this report—made lightning-quick progress to understand viral genomics, develop rapid tests, and launch trials of therapeutics. Startups and established companies shifted business models, applied their capacity to meet emergency needs, and irrefutably demonstrated the sector's resilience through months of disruption and mass unemployment. And health-care leaders spoke with a united voice, from the first summer surge through the arrival of vaccines, in support of science-informed guidance to limit community spread and save lives.

Almost two decades of commitment to the biosciences helped us navigate a year we hope never to repeat. But we still have much to do. Seeing more sharply the gaps to fill, we're called to find new models of collaboration between the biosciences and other sectors to ensure opportunity and equitable care for all Arizonans.

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» Arizona's COVID Response

TGen, universities form union to track spread of virus

The Arizona COVID-19 Genomics Union, comprised of researchers from the Translational Genomics Research Institute and the three state universities, tracks the spread and evolution of the new coronavirus through the genomic sequencing of Arizona patients. The group also confirms that the first case of COVID-19 in Arizona in January 2020 was successfully contained.

ASU Biodesign Institute develops saliva-based COVID-19 test

The first FDA-approved saliva-based COVID-19 test in the western United States, developed by Arizona State University researchers, provides a less-invasive and cheaper alternative to the nasal-swab test. Meanwhile, University of Arizona researchers develop an antibody test using a blood draw. Separately, ASU receives a \$12.5 million federal contract to help build the Serological Sciences Network for COVID-19 to study immune responses.

NAU launches center to test COVID-19 drug candidates

The Pathogen and Microbiome Institute at Northern Arizona University repurposes its existing biodefense research infrastructure to create the COVID-19 Testing Service Center. Researchers grow the SARS-CoV-2 virus and then test new drugs against it.

Universities track COVID-19 through wastewater

ASU, UArizona, and NAU monitor untreated wastewater to track spread of the coronavirus in Tempe, Tucson, and Flagstaff. The ASU research helps to launch the startup Aquavitas, which signs a federal contract for expanded studies. UArizona efforts likely prevent a surge in student cases by identifying two asymptomatic COVID-19 cases in a dorm.

TGen North researchers create early tests to identify disease

Scientists at TGen North develop an early test for COVID-19 and team with Flagstaff-based Poba Medical to produce about 10,000 COVID-19 test kits per month. TGen researchers later identify a molecule made from DNA—miR1307—that may influence the severity of the disease.

Barrow Innovation Center develops N95-substitute masks, face shields

The Innovation Center at Barrow Neurological Institute engineers reusable N95-substitute masks through a process of 3-D printing and silicone molding to create a tight seal, and develops other PPE prototypes, including face shields and general surgical masks.



“Clear metrics, focus, persistence, and collaboration: These hallmarks of the Roadmap have contributed meaningfully to the progress of the life sciences in Arizona, even through a year as tough as 2020.”

Eve Ross
Chair, Arizona's
Bioscience Roadmap
Steering Committee

RECENT HIGHLIGHTS

Student-run Luminosity Lab at ASU wins international face-mask challenge

ASU students win a \$500,000 prize in a worldwide competition for their design of a face mask to protect against COVID-19. In addition, Luminosity Lab develops two low-cost sterilization systems—one device using vaporized hydrogen peroxide to sterilize N95 masks, and a second using ozone to sterilize clothing and reusable masks—and creates the online PPE Response Network, enabling providers to request needed equipment.

Fashion incubator switches gears to make reusable hospital gowns

FABRIC Tempe, a fashion incubator that supports apparel entrepreneurs, makes more than 500,000 reusable, FDA-approved isolation gowns for health-care workers at local hospitals and on the Navajo Nation.

» Enhance Hospital Research, Clinical Care

Banner Alzheimer's plays leading role in breakthrough blood test

Scientists unveil a highly accurate blood test may be able to detect Alzheimer's disease as early as 20 years before the onset of cognitive impairment. Banner Alzheimer's Institute of Phoenix leads the international study that could dramatically impact research, treatment, and clinical care.

Phoenix Children's becomes first in the U.S. to use new robotic technology

The newly FDA-cleared Medtronic Stealth Autoguide™ cranial robotic-guidance platform for neurosurgery is introduced by Barrow Neurological Institute at Phoenix Children's during surgery for pediatric patients suffering from a range of neurological conditions.

HonorHealth Research Institute leads clinical trial for severe COVID-19 patients

Patients on a ventilator with COVID-19-associated acute respiratory distress syndrome participate in a clinical trial of the novel drug ruxolitinib. Meanwhile, HonorHealth opens its sixth hospital, Sonoran Crossing Medical Center, in north Phoenix with 70 inpatient beds.

Banner Health expands footprint in East Valley

Banner Ocotillo Medical Center in Chandler offers emergency care, intensive care, endoscopy, and women and infant services in its 124-bed, 240,000-square-foot facility. The Phoenix-based system also announces a \$54 million, 80,000-square-foot sports-medicine center will be built on the Salt River Pima-Maricopa Indian Community near Scottsdale.



INNOVATIVE CARE

EO 2020-15

Gov. Doug Ducey's executive order in March 2020 expanded telemedicine coverage during the pandemic. Next: A push for permanency.

RECENT HIGHLIGHTS

Texas-based group plans to develop six Arizona hospitals, including in rural areas

Dallas-based Exceptional Healthcare Inc. will invest \$150 million to develop six hospitals in Arizona, starting with the first hospital in the city of Maricopa, followed by Prescott and Yuma.

» Promote Entrepreneurial Climate

New UArizona business incubator opens in Oro Valley

The University of Arizona Center for Innovation at Oro Valley opens its 4,000-square-foot incubator with the capacity to support up to eight bioscience startups. The center partners with the Bioindustry Organization of Southern Arizona on a competition for startups.

Moonshot at NACET to provide services to Navajo entrepreneurs

Moonshot at NACET, an entrepreneurial-development program based in Flagstaff, will provide business planning and entrepreneurship training to Navajo entrepreneurs and existing businesses through a \$150,000 grant provided by the USDA Rural Business Development Grant Program.

Three Phoenix startups named finalists in international pitch competition

i-calQ, BMSEED, and Equus Innovations are three Arizona firms among 30 finalists in the BIO International Stadium Startup contest. The startups enable medical tests and results from a smartphone, help scientists study traumatic brain injuries, and treat equine injuries.

Statewide pitch competitions honor bioscience companies

Venture Madness awards \$15,000 in the medical category of its competition to Phoenix startup Additive Implants Inc., creator of cervical spacers for back and neck surgeries, while the Arizona Innovation Challenge names NeoLight and Sentinel Monitoring Systems, which provides rapid and real-time microbial monitoring, as 2020 awardees.

Fifth annual Arizona Bioscience Week features television special

The 2020 Arizona Bioscience Week pivots to a virtual format with a one-hour television special, Celebrating Life & Science, daily online community-educational programs and panels, and the White Hat Life Science Investor Conference, featuring 32 presenting bioscience firms.



“We have top-notch university researchers, entrepreneurial talent, and a strong angel-investment community. The right policy can really get the flywheel moving.”

Heather Carter
Vice Chair, Arizona's
Bioscience Roadmap
Steering Committee

» Build Critical Mass of Companies, Raise Venture Capital

GT Medical Technologies raises \$16M, gains FDA approval for brain therapy

A year after raising \$10 million, Tempe-based GT Medical Technologies Inc. raises another \$16 million for commercialization and receives FDA approval to use its targeted radiation therapy on newly diagnosed patients with brain tumors.



The Arizona BioMap

Arizona's most comprehensive bioscience directory now includes more than 1,100 organizations statewide. Visit flinn.org/biomap.

NeoLight earns \$7M in capital for neonatal therapy

NeoLight, a Phoenix-based medical-device company working to bring to the home hospital-grade neonatal care technologies, including jaundice treatment, raises \$7 million in financing from Dignity Health, HonorHealth, and Pittsburgh Steelers quarterback Ben Roethlisberger and his wife, Ashley.

New pharma manufacturer Medivant Health opens Chandler facility

The company's 33,000-square-foot manufacturing plant, featuring full automation, begins making generic drugs to address national shortages using vials made to exact dosage specification.

Startups receive federal grants, FDA clearance

Tucson-based drug startup EnduRx Pharmaceuticals is awarded a \$1.4 million Department of Defense grant to advance a new drug for breast cancer. Meanwhile, Emagine Solutions Technology of Tucson receives FDA clearance to market its VistaScan mobile ultrasound platform, and SafKan Health, also of Tucson, receives FDA approval of the first automated ear-cleaning device.

Caris Life Sciences grows Phoenix presence

Texas-based Caris Life Sciences, which previously acquired a TGen spinout, continues to expand lab space, to house as many as 1,500 additional employees in Arizona, as it advances precision medicine to target cancer.

TGen research on cancer in dogs leads to launch of commercial company

Vidium Animal Health's SearchLight DNA test enables veterinarian oncologists and pathologists to use genomic-based precision medicine to better detect, diagnose, and treat cancer in dogs.

» Advance Research Base

Latest figures show strong research expenditures for state universities

UArizona ranks No. 19 among U.S. public research institutions, with more than \$734 million in total research activity, according to the latest National Science Foundation data. With \$640 million in research activity, ASU is sixth among universities without a medical school and No. 26 overall among public universities, while NAU ranked No. 139 among public universities, with \$58 million.

Phoenix Biomedical Campus adds Wexford research facility, new wet lab and research space

Construction on the Wexford Science and Technology building, to be anchored by ASU, is completed, and the CEI LabForce incubator and ASU begin moving in. Meanwhile, a \$20 million project begins building out 48,000 square feet of lab and research space for the University of Arizona College of Medicine-Phoenix within the Biomedical Sciences Partnership Building.

C-Path awarded federal contract to improve neuroscience disease trials

Critical Path Institute, celebrating its 15th year, is awarded an FDA contract to improve the efficiency of trial design for Alzheimer's disease, Parkinson's disease, and Duchenne muscular dystrophy. C-Path also launches a consortium to accelerate medical-product development in sickle cell disease and a data-sharing collaboration to accelerate drug development for Type 1 diabetes.

UArizona awarded grants to fight skin cancer and Alzheimer's, increase screenings for Native Americans

The University of Arizona Cancer Center is awarded nearly \$10 million through two grants to prevent and decrease the risk of cell carcinoma and to continue collaboration with Native American communities to remove barriers for colorectal cancer screenings. Other grants will further research on therapies to address progression of Alzheimer's disease, investigate how cells respond to stress, and detect liver tumors.

Mayo Clinic, TGen researchers target most lethal pancreatic cancer

A study led by Mayo Clinic and TGen identifies drugs already in use for different cancers and non-cancer conditions that can be used to target the most aggressive and lethal form of pancreatic cancer.



NIH GRANTS

\$282 million

The gold-standard measure of bioscience research funding grew by 7% over Arizona's previous record high.

» Expand STEM Education, Develop Talent

ASU breaks ground on Mesa City Center academic building

The partnership between Arizona State University and the city of Mesa will include a \$73.5 million downtown Mesa building that will include technology programs to explore augmented reality, virtual reality, and 3D modeling for innovations that could aid health care.



TRIF FUNDS

\$11.7 million

In 2020, Arizona's Technology and Research Initiative Fund devoted 14% of expenditures to educational-access and workforce initiatives.

Construction milestone reached on Creighton University's Phoenix campus

The \$100 million, 180,000-square-foot Creighton University Health Sciences Phoenix campus building at Park Central moves toward completion of construction. The facility plans to open in 2021 and welcome future physicians, nurses, occupational therapists, physical therapists, pharmacists, and physician assistants.

UArizona veterinary medicine accepts first class

The first class of UArizona's new College of Veterinary Medicine in Oro Valley—the first public veterinary medicine program in the state—includes 110 students, with 46 from Arizona.

\$200 million ASU science building tops out on way to 2021 opening

The \$192 million Interdisciplinary Science and Technology building project at ASU, which will be home to leading-edge research and labs, tops out its construction, with plans to open in 2021.

STEM celebrations encourage youth to study science

The Flagstaff Community STEM Celebration attracts more than 2,000 community members for the seventh straight year, bringing families together for events promoting science, technology, engineering, and math. The Southern Arizona Research Science and Engineering Foundation receives a record-breaking 2,225 science project submissions for its annual fair.

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Additional information on
Arizona biosciences is at
www.flinn.org/progress.