Bioscience Connecticut
Report to the General Assembly

October 2019

Bioscience Connecticut is a bold initiative, designed to jumpstart Connecticut's economy by creating construction-related jobs immediately and generating long term, sustainable economic growth based on bioscience research, innovation, entrepreneurship and commercialization.

UCONN HEALTH

THE POWER OF POSSIBLE.

Introduction

Bioscience Connecticut aimed to strengthen our State's position as a national and global center for bioscience innovation and to improve access to quality health care for Connecticut citizens while simultaneously securing UConn Health's future as a top tier academic medical center.

UConn Health, June 2012

UConn Health, May 2019

This is the fifth biennial report to update the General Assembly on progress of the initiative pursuant to the provisions of Conn. Gen. Stat. §10a-109mm. As all infrastructure and programmatic initiatives associated with Bioscience Connecticut have recently been completed, this will be the final report submitted to the General Assembly.

Bioscience Connecticut Overview

Championed by former Governor Malloy and approved by the General Assembly, the Bioscience Connecticut initiative was enacted in 2011 through Public Act 11-75. It is a bold plan to position Connecticut at the forefront of the growing bioscience industry. As a catalyst for that growth, the State committed to making strategic investments in the University of Connecticut Health Center (UConn Health).

As the State's only public academic medical center, UConn Health serves Connecticut through excellence in education, patient care, research, and commercialization and technology transfer. It is Connecticut's primary source of new physicians and dentists (it is one of three medical schools, and the only dental school in the state); a key provider of vital health services to some of our most vulnerable citizens; and an engine of economic growth. Bioscience Connecticut is composed of two major components:

1. **Infrastructure** expansion and renovation – that is, the buildings and facilities that house our doctors and scientists, and that educate and train our medical, dental and graduate students, and
2. **Programs** to improve access to quality health care.

A summary and status of the work undertaken under each of these components are provided in the sections below.

Summing Up – The Successes of Bioscience Connecticut

By all accounts, Bioscience Connecticut has been a tremendous success. Not only have the specific goals of the Bioscience CT initiative been achieved, but the initiative has also enabled UConn Health to make tremendous strides in all areas of its mission – education, research, and patient care – as well as enabling UConn Health to contribute significantly to economic development throughout the region and the State.

In the area of **education**, UConn's Medical and Dental Schools have exceptional reputations nationally and are educating more students than ever, having grown enrollment by 30% since Bioscience Connecticut began. This growth in enrollment was a specific goal of Bioscience Connecticut. Furthermore, UConn Health provides exceptional Medical and Dental education to its students – the vast majority of whom come from Connecticut homes – at a more affordable cost than its private school counterparts, so that UConn's students do not carry as much debt when they begin their careers. UConn's Medical and Dental School graduates also remain in Connecticut to train, and later choose Connecticut to practice in their fields, at far higher rates than any other school in the state.

Additionally, while enrollment has grown in UConn's Medical and Dental Schools, so has our diversity. Indeed, the UConn School of Medicine was recently named by U.S. News & World Reports as one of the top 10 medical schools in the nation for diversity of its student body, with African American students comprising 11.8% of the student body, well above the national average of 6%. The School's population of underrepresented individuals in medicine has steadily grown in recent years to nearly 23%.

In the areas of **research and economic development**, due in large part to the laboratory renovations made possible through Bioscience Connecticut, UConn Health brought in over $106 million in external research grants and contracts in fiscal year 2019, and it is anticipated these revenues will further grow another 3% in FY20. These are primarily funds from the federal government, and private and non-profit organizations. The vast majority of these funds are used to support jobs in our state: PhDs, research assistants, lab technicians, and others, as well as scientists in training such as Master's and PhD students and fellows. The exciting work of UConn Health researchers not only serves as a foundation for future medical breakthroughs, it is also a future economic driver for the state, spurring patents and spin-off start-up companies.

Some of those start-up companies are housed in UConn's Technology Incubation Program (or "TIP"). TIP is a program that UConn Health was able to expand as part of Bioscience Connecticut, to help accelerate the growth and success of start-up bioscience and high-tech companies in our state. UConn Health's TIP has been highly successful since its expansion in 2015 and, indeed, other entities are looking to model their technology incubation centers after it. More information about TIP and its successes are outlined in the sections below.

UConn Health is also growing and succeeding in **patient care**. Since 2013, patient care volume overall has steadily risen by 7-9% per year, led by strong increases in surgical volume, outpatient visits, Emergency Department visits and hospital inpatient discharges. Strategic hiring of primary care and specialty physicians has enabled UConn Health to expand access and successfully grow service lines and volume. UConn Health's market share in its primary and secondary services areas has also grown in recent years.

Along with the increase in clinical volumes, UConn Health has seen strong **growth in clinical revenues, which have increased nearly 60% since 2013**. Clinical revenue from patient care now comprises close to 50% of UConn Health's nearly $1.2 billion annual budget. Current budget projections for FY20 are expecting clinical revenue to grow further by $29.1 million, or 5.4%. These clinical volume and revenue increases are due in large part to the new and expanded facilities on UConn Health's campus and the increased clinician-scientists hiring made possible through Bioscience Connecticut.

Although UConn Health's financial and operational fundamentals are stronger than ever, the institution continues to have fiscal challenges, due to the costs of the state's unfunded pension and health care liabilities that are charged to UConn Health. **Absent the state's unfunded liabilities, UConn Health would have ended Fiscal Year 2019 $20.9 million ahead of budget, and projects that it would end Fiscal Year 2020 $3.8 million ahead of budget.**

Bioscience Connecticut Infrastructure Projects

Bioscience Connecticut has transformed the UConn Health campus in Farmington. The campus now includes state-of-the-art laboratory, teaching, business incubation and patient care facilities. These new and renovated spaces enable UConn to: grow research and new businesses to boost Connecticut's economy; provide medical and dental education to our students that supports growth and a first-rate, modern curriculum; and improve access to quality health care for our citizens. Further, these new and renovated facilities greatly improve UConn Health's ability to recruit and retain the best clinicians, researchers, staff and students to study, work and live in Connecticut.

The capital component of Bioscience Connecticut is now complete, with the final project substantially complete as of May 2019.

The following chart provides a brief summary of the major infrastructure projects associated with Bioscience Connecticut, and a description and status of each project. Additional detail for each project follows in the section entitled "A Closer Look."

Project	Description	Status
Incubator Lab Addition	New 28,000 net square foot building addition to the existing Cell and Genome Sciences Building, more than doubling the amount of new incubator space at UConn to foster new business start-ups, particularly in the technology and biomedical fields.	Design began 9/2013 **Work completed 12/2015** **Opened 1/2016** **Currently 98% occupied**
Main Building Research Lab Renovations	Two multi-phased renovation projects renovating 200,000 of the 283,000 square feet of existing research lab facilities and building infrastructure.	Project 1 design began 4/2009; **completed 9/2015** Project 2 design began 12/2015, **completed 3/2017**
Academic Building Addition & Renovations	A 19,153 square foot classroom addition and renovation of existing classrooms, office, and lab space. Renovations include the upgrade of the mechanical, electrical and plumbing infrastructure and program expansions.	Design began 1/2013. **Academic Addition completed 7/2016** Existing academic facilities renovations **completed 7/2017**

Project	Description	Status
UConn Health Outpatient Pavilion	Construction of a new 306,880 square foot ambulatory care facility, occupied by the Carole and Ray Neag Comprehensive Cancer Center and other outpatient services. This project includes a new parking garage of approximately 1,400 spaces.	Design began 12/2011 **Work complete and opened 2/2015** **Final fit out of 8th floor completed 7/2016**
New Hospital Tower, Site & Parking	Construction of a new 384,000 square foot, 169 bed, eleven floor hospital tower housing key patient areas including the emergency department, surgery suite, MRI suite, renal dialysis, respiratory therapy, inpatient rehab (orthopedics, rehab gym and workspace), clinical support, and patient education space. The project includes a new 403 space public garage and a new 397 space staff garage.	Design began 9/2010. **Hospital occupied and operational 6/2016**
Clinical Building and Existing Hospital Renovations	Multi-phase renovations include the upgrade or replacement of the mechanical, electrical and plumbing infrastructure and program expansions for the Pat and Jim Calhoun Cardiology Center, the School of Dental Medicine, and several existing hospital departments.	Design began 12/2013 **Work complete 5/2019**

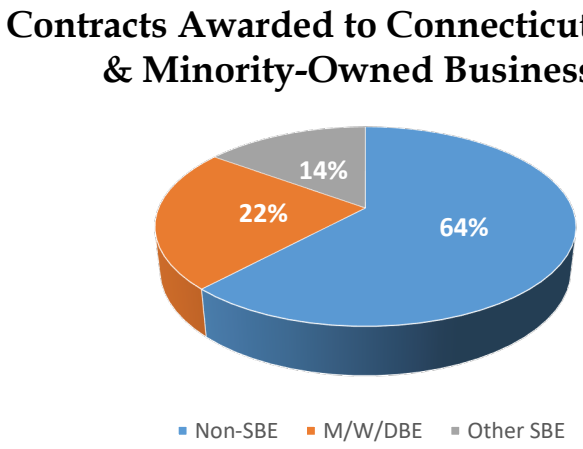
Bioscience Connecticut Infrastructure Projects - Key Business Metrics

As stated above, one of the goals of Bioscience Connecticut was to jumpstart Connecticut's economy by creating immediate construction-related jobs. The initiative has been exceptionally successful in achieving this goal, and UConn has placed particular emphasis on contracting with Connecticut companies and with small, minority-owned, and disadvantaged businesses.

Below are some key business metrics for the Bioscience Connecticut infrastructure projects. These figures represent work completed and contracts awarded through May 2019:

- Construction Jobs:
  - 6,200 jobs created
  - 3,142,000 hours worked
  - Veteran worker participation – 3% (41,855 hours worked)

- Contracts Awarded:
  - 85% of contracts awarded to Connecticut companies. Total contract value = $434.9 million.
  - 36% of contracts awarded to Connecticut small businesses. Total contract value = $186.5 million. *(Note: this far exceeds the State goal of 25%)*
  - 22.2% of contracts awarded to Connecticut minority-owned, women-owned and disadvantaged businesses. Total contract value = $114 million. *(Note: again, significantly exceeding the State goal of 6.25%)*



Category	Obligated Contract Values	Required	Goal	Projected	% Above or Below	
					Required	Goals
M/W/DBE	$ 114,082,060	6.25%	10.00%	22.22%	+16%	+12%
Other SBE	$ 72,402,166			14.10%		
Total SBE	$ 186,484,226	25.00%	30.00%	36.32%	+11%	+6%
Non-SBE	$ 326,972,214			63.68%		
Total	$ 513,456,440					

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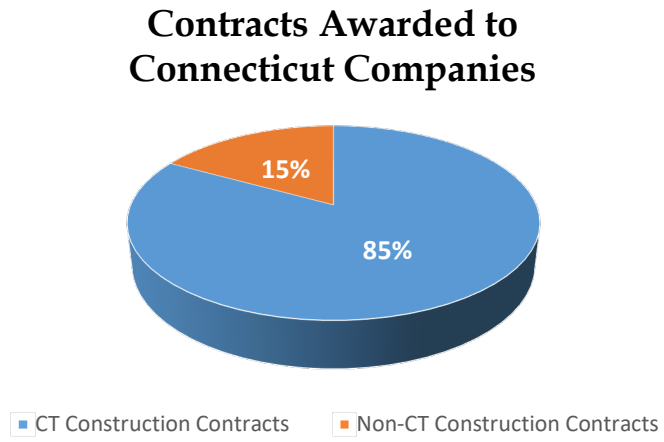


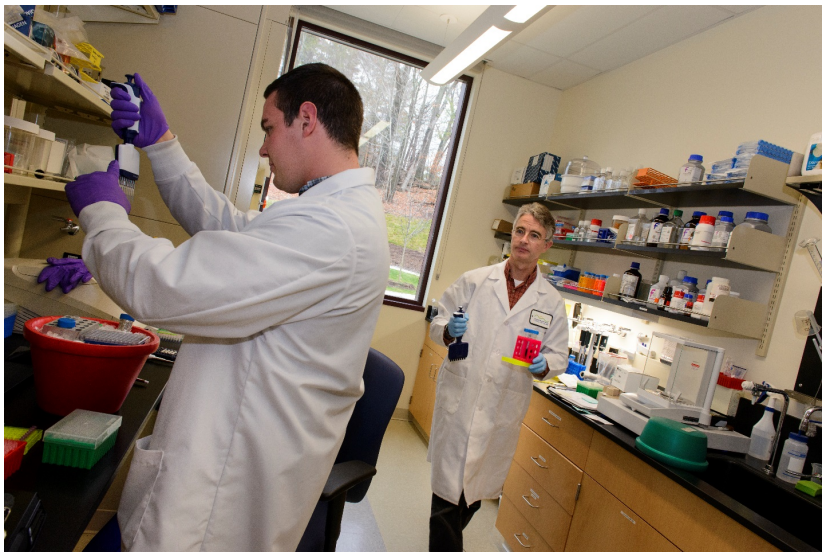
Category	Awarded Contact Values	% of Total
CT Construction Contracts	$ 434,874,147	85%
Non-CT Construction Contracts	$ 78,582,293	15%
Total	$ 513,456,440	100%

Infrastructure Projects – A Closer Look

Incubator Lab Addition

To foster new technology and bio-medical business start-ups in Connecticut, UConn's Technology Incubation Program (TIP) offers incubator facilities at two locations across the State – Storrs and Farmington. These facilities are in high-demand and have been extremely successful. Through Bioscience Connecticut, UConn has more than doubled its total incubator lab space by building a 28,000 net square foot addition onto the Cell & Genome Sciences Building, located at 400 Farmington Avenue in Farmington. The new facility opened on January 1, 2016.

TIP attracts and supports new Connecticut businesses by leasing space and equipment to start-up technology and bio-medical companies.



In addition, TIP is able to offer these companies access to a unique range of unparalleled resources including:

- Incubator facilities featuring wet labs and access to instrumentation
- Customized business planning and mentoring
- Technically trained student employees and graduates
- The university's world-class library resources
- Collaboration with scientific experts

Equipment / Instrumentation. Technology and bio-medical start-ups often have a need for large, specialized and/or expensive equipment that they are unable to purchase or lease themselves. Often, the university already owns such equipment. TIP helps the start-ups negotiate agreements with the university for use of the equipment, given that time is available on the instrument and client employees have been properly trained. This enables start-up companies to have access to specialized equipment that the company may not otherwise be able to afford, if located elsewhere.

Customized Business Support Services. Through a network of service providers, advisors, and entrepreneurs-in-residence (EIRs), TIP offers access to a variety of business consultants and expertise, including accountants and lawyers to help with issues important to start-up companies. TIP also supports business plan development, organizes events to promote

collaboration among UConn faculty and scientists, and provides access to experienced entrepreneurs, advisors, and mentors. Further, through UConn's School of Business, TIP can access knowledgeable faculty and students who can provide advice to emerging companies.

Student Employees / Interns. In addition to its state-of-the-art facilities, a key benefit of TIP is its ability to connect incubator companies with university faculty and students. As part of its program, TIP advertises to suitable students and helps recruit them to work as part-time employees, interns, and potential future full-time employees.

Libraries. The University of Connecticut Libraries have the largest public research collection in the State. The collection includes books, print and electronic periodicals, microfilm, maps, sound and video recordings, musical scores, and an ever-growing array of electronic resources, including ebooks, streaming audio and video collections, as well as art and photographic image databases.

Additional information relating to the number of companies in TIP, jobs created, intellectual property secured, revenue raised, and other metrics can be found in the **Research, Innovation and Commercialization** section below.

Main Building Research Lab Renovations

The Research Labs in the Main Building on the UConn Health campus were constructed in 1971 as part of the original UConn Health construction. These facilities had not undergone any significant renovations since they were built.

Bioscience Connecticut enabled the renovation of 200,000 square feet of the existing 283,000 square feet of labs on 7 floors in two successive projects. Project 1 was completed in September 2015, and Project 2 was finished in March 2017. Please note that some additional lab renovations have been deferred until a later date; further explanation of the deferral can be found on page 17.

The renovation projects have created attractive, state-of-the-art, large, open lab areas that are capable of housing multiple research groups and thus foster collaboration between and among scientists with common research interests. They have been a tremendous asset in the recruitment and retention of outstanding faculty and research staff. There are now 333 scientists, technicians, and support staff who work in the newly renovated laboratories. The faculty who occupy office laboratory and/or office space in the area are responsible for generating nearly $110 million in active research grants, which includes over $27 million for the current funding year.

In addition to the functional and aesthetic benefits of the renovated labs, the aged and inefficient mechanical and electrical systems that serve these areas were replaced as part of the project, allowing for greater energy efficiency and modern control of the environment.

Renovated Research Lab

The labs also provide space for both the Medical and Dental School Research work. Examples of just a few of the cutting edge research and collaborations taking place in the renovated labs include:

- Studies of the rare bone diseases Albright Hereditary Osteodystrophy and Osteogenesis Imperfecta that may lead to cures for these childhood conditions;
- The Carole and Ray Neag Comprehensive Cancer Center's development of a vaccine to prevent the reoccurrence of Ovarian Cancer;
- **NMR**box facility, which is a national Biomedical Technology Research Resource supported by the National Institutes of Health (NIH) that develops software used in the determining protein structures which aid in understanding human disease and in drug development;
- NIH-funded kidney research laboratory seeking to understand the cause of chronic kidney disease;
- Alzheimer's and cognitive disease programs funded by NIH that promise to discover new treatments for these disabling conditions;
- The NIH-funded Alcohol Research Center with work focused on neuroactive steroids as potential medicinal targets for treating heavy drinking individuals, including those with alcohol dependence.

Academic Building Addition & Renovations

One of the key goals of the Bioscience Connecticut initiative is to attract more students to practice medicine and dentistry in Connecticut. In order to achieve this goal, it was necessary for the UConn School of Medicine and School of Dental Medicine to expand and update its academic spaces.

Academic Building Addition

The academic addition and renovations undertaken at UConn Health also support the new UConn Medical and Dental curriculum, termed MDelta, which was launched in the fall of 2016. MDelta reflects current practices in health care, focusing more on team-based learning, and less on lecture-style coursework. Research has shown that effective learning is collaborative and social, not competitive and isolated. Faculty facilitate collaborative group work, allowing students to practice problem solving and the application of knowledge in clinical case-based exercises, reflective of contemporary methods in medicine.

The MDelta curriculum also includes early and sustained clinical exposure, as early as the first month of school; integration of clinical medicine with the basic sciences over all four years; enhanced use of medical simulation exercises in both gross and virtual anatomy labs as well as radiology, using state-of-the-art medical imaging; individualized education, and a focus on self-directed learning that respects diverse talents and ways of learning.

The new Academic Building Addition and renovations, made possible through Bioscience Connecticut, perfectly support the new MDelta curriculum. The new facilities allow for team-based learning and modern, effective, state-of-the-art education of our future medical and dental providers.

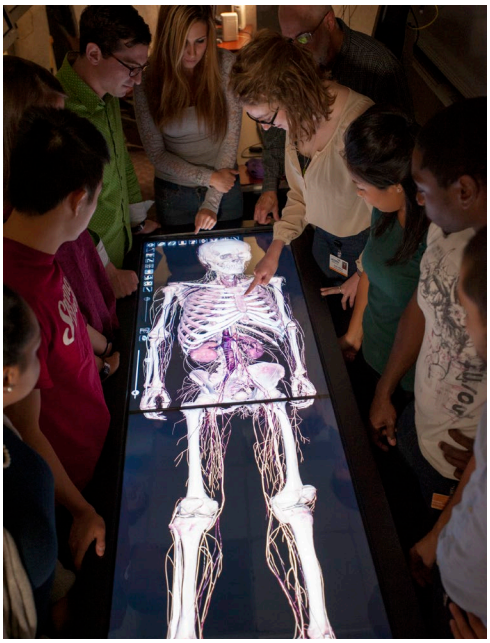
Academic Rotunda

In total, the work included a 17,600 square foot classroom addition and renovation of existing classrooms, office, and lab space.

Renovations also included the upgrade of the mechanical, electrical and plumbing infrastructure. Specifically, the Academic Building Addition includes:

- A large Academic Rotunda, to support team-based learning and a variety of other programming;
- 8 new classrooms (plus 8 new classrooms provided by renovations at the connection to the existing Academic Building); and
- Informal gathering/study lounge spaces.

This work was completed in the summer of 2016, in time for the incoming students in the Class of 2020. Renovations to the academic virtual anatomy lab, the medical school administration space, two new dental classrooms, and a wellness center were completed in 2017.



Digital 3D Simulation Patient

UConn Health Outpatient Pavilion

In 2015, UConn Health opened its new 306,000 square foot state-of-the-art Outpatient Pavilion on its lower campus, offering a full-range of primary care and specialty services in one convenient, modern location. Construction also included a completed 1,400 space parking garage for patients, visitors, and employees. Unlike the other components of the Bioscience Connecticut initiative, this project was privately financed by UConn Health.

UConn Health Outpatient Pavilion

Since opening in February 2015, the Outpatient Pavilion has seen an increase in its patient visits from approximately 12,000 per month to on average 16,000 per month. This volume represents a nearly 34% increase in outpatient encounters for UConn Health, to date. This increase in volume is in part due to a significant focus on access and provider recruitment in a number of fields located within the Outpatient Pavilion. Specifically, UConn Health has increased access and physician and other providers in areas such as medicine, neurology, general surgery, ophthalmology, family medicine, spine, neurosurgery, cancer, OB/GYN, Maternal Fetal Medicine (MFM) and vascular surgery.

In FY17, UConn Health saw significant growth in the Outpatient Pavilion when we opened the Women's Health Center on the 8th floor of the building. This specialty offers a range of services including OB/GYN, MFM (high-risk pregnancies), specialized ultrasounds, minimally invasive gynecologic surgery, prenatal genetic counseling, reproductive medicine, and breast feeding consultation. In addition, the Beekley Imaging Center, a part of Women's Health, offers advanced imaging services such as gynecologic ultrasound and 3D mammography – all on one floor. Another service that was added in FY17 was the new family medicine practice, which cares for patients of all ages, from children to older adults.

This patient-centered building offers other expanded clinical outpatient services which include: advanced radiation therapy, stroke and neurology care, dental clinics, rehabilitative medicine, a full range of geriatric services, a beautifully designed cancer infusion center for patients receiving chemotherapy and a cancer center. The building also houses ophthalmology and neuro-ophthalmology specialized services, a comprehensive spine center (orthopedic and neurosurgery), radiology, and the convenience of blood draw stations. Arrow Pharmacy and Harvey & Lewis optical shop are also located in the Outpatient Pavilion.

UConn Health's lower campus continues to grow as we have implemented our new electronic medical record system across the enterprise, continue to survey patients and staff to improve the patient experience and focus on continued excellence and quality improvement.

University Tower - UConn John Dempsey Hospital

The new 384,000 square foot University Tower was built around patient needs. It includes 169 private inpatient rooms and 28 modern Intensive Care rooms with advanced monitoring and features to support visitors and patients. This project also included a new 403 space public parking garage, and a new 397 space staff garage.

University Tower

The new Emergency Department (ED) includes more than 40 private patient-care rooms, a dedicated CT Scan and X-ray, and an ED fast track for minor emergencies so that we can accommodate and ensure patient privacy, safety, and speed. The ED is also prepared for high-risk and specialized emergencies, featuring decontamination rooms, resuscitation rooms, and tools for dental emergencies.

Ten state-of-the-art, spacious operating rooms can handle the complexity of all cases, and 30 private pre- and post-surgical recovery rooms offer safety and quality. Each OR and the ED resuscitation room is equipped with Black Diamond HD cameras and plasma screens for live broadcasting for training and medical education.

Emergency Department, March 2018

The new hospital construction provided space to allow for two new 1,000 square foot Hybrid Operating Rooms that can be equipped with imaging capabilities for minimally invasive and complex procedures. The fit-out of the first of the two rooms was completed in March 2018 and planning work for the second room may take place in FY2020.

Nurses stay connected using phones linked with patients' bedside call systems to improve response time and increase patient satisfaction. Smart "TUG" robots were operationalized in 2017 to augment the high-speed tube system to safely get medication from pharmacy to patients.

UConn Health Clinical Building

Renovations to the UConn Health Clinical Building were substantially complete as of May 2019. This was an extremely complicated multi-phase renovation project that included the upgrade or replacement of the mechanical, electrical and plumbing infrastructure. The project focused on program expansions for the Pat and Jim Calhoun Cardiology Center, renovations for Clinical Research, multi-specialty clinics, reconfiguration of the Main Lobby, a new blood draw area, and significant renovations and expansion of the School of Dental Medicine teaching clinics. The new state-of-the-art Dental Care Center features 174 treatment rooms and a dedicated imaging suite.

Existing Hospital Renovations

The Bioscience Connecticut initiative provided that $69 million in funding from UConn Health operations, special eligible gifts or other sources would be used for new construction and/or renovation projects. UConn Health and the University of Connecticut Foundation continue efforts to identify funding opportunities to meet this $69 million goal; however, to date the entirety of these funds have not been raised. Due to the challenging fiscal environment at the state level, including sustained cuts in state support, UConn Health operations is unable to cover this expense at this time. As a result, the renovations to John Dempsey Hospital's existing tower (the "Connecticut Tower") to allow for expansion of certain departments, and infrastructure replacements and upgrades of the electrical, heating, and air conditioning systems and a portion of the Lab Building renovations, have been deferred at this time.

Renovated Dental Care Center

Bioscience Connecticut Programmatic Initiatives

In addition to the infrastructure projects described above, Bioscience Connecticut also included a number of programmatic initiatives designed to improve access to quality health care in Connecticut.

The overall success of the Bioscience Connecticut initiative greatly depends upon the success of these programmatic initiatives. While modernizing infrastructure is critically important, it is not sufficient to merely build new facilities, we must fill up those facilities with outstanding medical practitioners, researchers and faculty members to further discoveries, bring new discoveries to market and to the bedside, and provide access to quality healthcare; we must expand educational opportunities for the next generation of medical professionals; and undertake programs that address health disparities and that encourage professionals to stay and practice in Connecticut.

Bioscience Connecticut included the following programmatic initiatives for UConn:

- *New Faculty & Research*. Recruiting 50 new faculty, including basic scientists and clinician-scientists, to increase health care access and federal industry research awards;
- *Expanded Medical & Dental School Enrollment*. Expanding the UConn School of Medicine and the UConn School of Dental Medicine class sizes by 30 percent;
- *Loan Assistance for Future Connecticut Doctors Practicing Primary Care*. Implementing a loan forgiveness program for UConn Medical School graduates who pursue careers in primary care in Connecticut;
- *Cancer Trials*. Supporting the development of a comprehensive cancer center to expand clinical trials and advance patient care at multiple sites in the Hartford region;
- *Primary Care Institute*. Supporting the development of a primary care institute located on the campus of Saint Francis Hospital and Medical Center, the Connecticut Institute for Primary Care Innovation, that is intended to increase the number of primary care providers in the state by engaging in research and training to facilitate the effective delivery of primary care; and
- *Addressing Health Disparities*. Developing a health disparities institute sponsored by UConn that will enhance research and the delivery of care to the minority and medically underserved populations of the state.

New Faculty & Research

Faculty Hires

One goal of Bioscience Connecticut was to increase the number of clinical faculty and basic scientists at UConn Health, and to promote UConn Health and The Jackson Laboratories for Genomic Medicine (JAX-GM) to jointly hire scientists to encourage collaboration between the two institutions. The Bioscience CT goal was to recruit 50 new faculty, including basic scientists and clinicians, 10 of whom would be joint UConn-JAX GM hires.

UConn Health has far exceeded its goal of 50 new faculty hires. Indeed, through FY18, UConn Health had hired 71 new basic science faculty members and another 179 clinical faculty members. While some of these hires are replacement faculty members for individuals who have left the university, net hires still far exceed the original goal of 50 and hiring continues to be vigorous. Five world-class physician-scientists have been jointly recruited and hired with JAX-GM, and active recruitment efforts continue to hire the remaining 5 joint hires.

Jackson Laboratories for Genomic Medicine

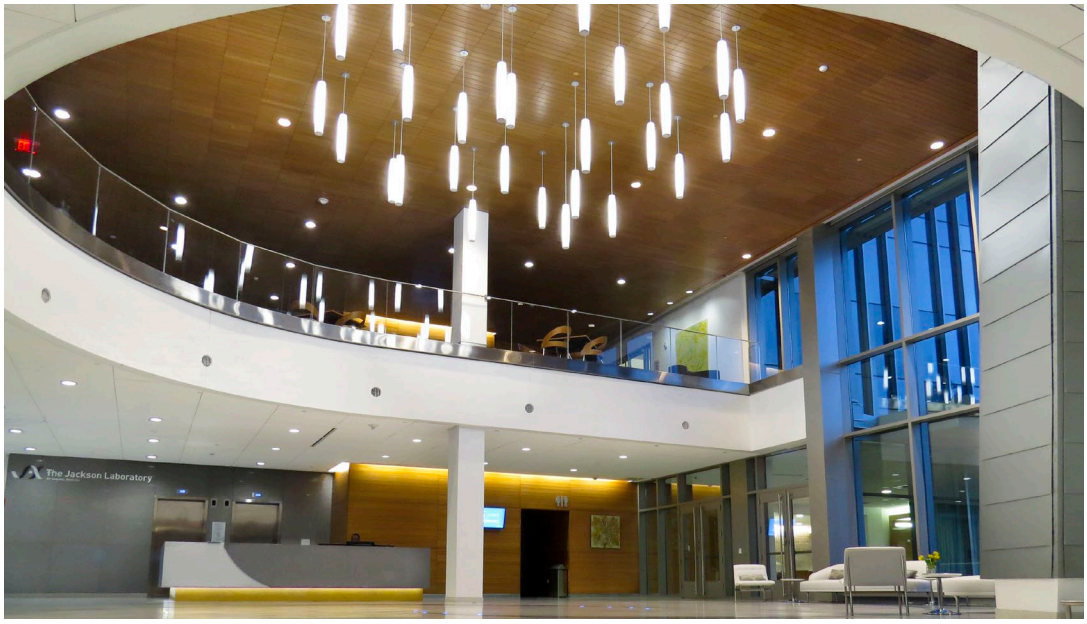
Research

Newly recruited faculty, combined with the efforts of existing faculty, have increased research metrics in all categories at UConn Health despite decreasing levels of NIH funding nationwide. Through December 2018, awards were up 17% over the 3 year average for the same period for FY16 through FY18, with federal awards being up 29%. UConn Health senior faculty have received several large awards and are expecting another large award for $11.4 million for vaccine development.

While the award news is positive, the actual financial impact to UConn Health is more muted. Many awards are collaborations with other academic institutions where dollars are awarded to UConn Health as the prime institutions, and are subsequently passed through to our collaborators for their roles in the awarded projects. While the grant funds flow through UConn Health, these costs do not fund positions at UConn Health, nor do they return much in the way of indirect cost recoveries. Established relationships usually drive these collaborations, but high state fringe benefit rates, primarily due to the state's unfunded liabilities, charged by the state to UConn Health, also contribute to the decision on how work is allocated among the collaborating institutions.

Collaborations with JAX-GM

Faculty members at UConn and The Jackson Laboratory have submitted more than $100 million in joint grant submissions to date, and have already secured more than $33 million of extramural funding. Nearly $29.5 million of these extramural awards involve scientists from UConn Health; the funding has come mostly from the National Institutes of Health.



Atrium of Jackson Laboratory

UConn and JAX have also collaborated on the Center for Single Cell Genomics. This joint investment, one of the first of its kind in the nation, has already yielded returns through funded grants and grant applications. Additionally, the opportunity to be joint faculty hires at UConn and JAX has attracted five leading experts who are generating research and economic activity in growing fields of study: Reinhard Laubenbacher, director of the Center for Quantitative Medicine; J. Travis Hinson, a cardiologist focusing on genomic approaches to heart disease; Christine Beck, a cancer/computational biology researcher; SeJin Lee, renowned for having developed the "mighty mouse;" and Ching Lau, an international expert in pediatric brain and bone tumors.

Additionally, scientists from UConn, JAX, Yale and the Weizmann Institute of Science in Israel have formed a Metabolic Research Alliance aimed at finding a cure for diabetes, metabolic diseases and health complications.

UConn and JAX are also collaborating on the research training of UConn PhD and MD-PhD students to produce the next generation of Connecticut's researchers, computational scientists and clinician scientists, with a specific focus on genomic sciences.

Research, Innovation & Commercialization

UConn Health has also had significant success in efforts to commercialize university technologies and to establish and/or expand industry partnerships.

To date, half a dozen UConn researchers from Storrs and Farmington are working to identify potential new drugs to treat a wide range of diseases and conditions through a unique partnership with Atomwise, a biotech company. The researchers have been using Atomwise's AI-powered in silico screening technology to develop therapeutic treatments for, among other conditions, certain types of strokes, hand-foot-and-mouth disease, and an infection that causes reproductive failure in pigs. The collaboration has resulted in over $1 million in-kind contribution from Atomwise for UConn faculty.

Members of UConn's leadership have also been pleased to collaborate with other academicians and industry partners as part of Governor Lamont's Life Science Working Group. The role of this group is to provide guidance to the Governor and other public officials on strategic priorities for Connecticut's growing biotech sectors.

Through joint funding from CTNext and UConn, and in partnership with institutions statewide, the university has been able to establish several programs aimed at supporting bioscience researchers, entrepreneurs, and industry in Connecticut.

Some examples:

- **Partnership in Innovation & Education (PIE):** An expansion of the UConn TIP Summer Fellowship Program, PIE aims to help build Connecticut's future health and technology workforce and to encourage bioscience commercialization in the state. As part of the 10-week summer program, students from colleges and universities around the state gain hands-on research experiences, learn about innovation concepts like cutting-edge technologies used in bioscience research, work with startups on business or R&D projects, and present their research to a community of investors, researchers, and startups at the end of the summer.

- **High Value Talents Seminars:** This program is a new industry-academic initiative to increase entrepreneurial education and output among the state's top researchers from UConn, Unilever, Quinnipiac and Wesleyan Universities, and The Jackson Laboratory. With funding through a grant from the CTNext Higher Education Entrepreneurship and Innovation Fund, the goal is to increase the

number of successful ventures coming out of universities in the state; launch new products and/or business lines with corporate partners; attract investment and partnership deals for these startups and products; and improve the entrepreneurial ecosystems at these institutions to better attract and retain researchers.

- **START Preliminary Proof of Concept Fund:** Through a generous grant provided by the CTNext Higher Education Fund, UConn's Office of the Vice President for Research (OVPR) is administering a new early stage translational research fund to support the preliminary validation of innovative early stage technologies that have possible commercial potential and is designed to bring those technologies to a stage that may be more attractive for additional later stage translational funding support. Faculty from UConn, UConn Health, Central Connecticut State University, Southern Connecticut State University, and University of Bridgeport are eligible for START.

UConn remains a committed contributor to other existing programs that enhance bioscience activity across the state, such as Biopipeline CT. UConn, Yale University, and Quinnipiac University have joined forces with Connecticut Innovations and the Bioscience Innovation Fund to help commercialize biomedical technology innovation, such as medical devices, diagnostics and health information technology. The program provides selected applicants with $30,000 per project of much-needed gap funding to seedling companies or faculty and student groups associated with any Connecticut university.

The UConn Technology Incubation Program (TIP) remains a major contributor to Connecticut's bioscience community. Because of Bioscience Connecticut, TIP was able to significantly expand in Farmington and it officially opened the doors of its newly expanded facility in January 2016. As of June 2018, 30 of the 39 companies in the program were located at the TIP facility at UConn Health in Farmington, representing 98% occupancy.

FY18 TIP Company Data:

	Farmington	**Total TIP**
Revenues/Grants	$15.8M	$20.6M
Equity/Debt	$75.0M	$75.6M
Employees		
- Full Time	98	118
- Part Time	39	53

UConn's Technology Transfer & Venture Development teams are dedicated to transforming UConn discoveries into products and services that benefit patients, industry, and society. The unit aims to bring together UConn researchers and the business community in order to significantly enhance the commercial and societal impact of UConn's research, from both the physical and life science sectors.

FY 18 Technology Commercialization Data:

- 71 invention disclosures received
- 86 U.S. patent applications filed
- 39 patents issued
- 22 licenses & options executed
- $887K licensing revenue
- 7 start-up companies formed (FY18)

Expanded Medical & Dental School Enrollment

While not specifically outlined in statute, one of the goals of Bioscience Connecticut was to increase the number of students in the School of Medicine and the School of Dental Medicine by 30%.

When Bioscience Connecticut passed, the School of Medicine enrolled 85 students per class; therefore, a 30% increase amounts to an additional 25 students, or a total of 110 students per incoming class. Enrollment at the School of Medicine has gradually increased since the Bioscience Connecticut began. UConn Health is pleased to report that, this August (2019), the School of Medicine welcomed the Class of 2023 with 110 students, meeting the goals of the Bioscience initiative.

The School of Dental Medicine's base when Bioscience Connecticut passed was 40 students per class. A 30% increase amounts to an additional 12 students per class, or a total of 54 students. UConn Health welcomed its incoming Dental School Class of 2023 in August 2019 with its largest class ever -- 52 students -- exceeding the Bioscience CT goal.

Schools of Medicine and Dental Medicine, White Coat Ceremony, August 2019

Details on the UConn Medical and Dental School Classes of 2023 are as follows:

UConn School of Medicine - Class of 2023

- 110 medical students
- 3,126 applicants
- 73% from Connecticut
- 38% UConn undergrads
- 57% female; 43% male
- 20% underrepresented minorities
- 23% underrepresented in medicine

UConn School of Dental Medicine - Class of 2023

- 54 dental students
- 1,286 applicants
- 48% from Connecticut
- 30% UConn undergrads
- 52% direct from undergrad
- 50% female; 50% male
- 26% underrepresented minorities
- 26% underrepresented in dentistry

Loan Assistance for Future Connecticut Doctors Practicing Primary Care

UConn's School of Medicine has developed a Primary Care Loan (PCL) program for School of Medicine students. The goals of this program are to support the aspirations of students interested in careers in primary care by addressing their financial concerns with entering this field; and to increase the number of graduates of the School of Medicine who pursue primary care practice in Connecticut.

Benefits. At the time of its inception in 2016, program participants were awarded loans of $30,000 per year at a nominal interest rate of 1% for up to 3 years. The 1% loan rate saves a student who participates in the program for three years approximately $47,000 in interest payments over the ten year repayment period of the loan. In 2017, the loan amount was increased to $35,000 with the same 1% interest rate.

Loan Criteria. The following conditions are included as part of the PCL program:

- Students selected for the program are required to devote one year of service practicing full-time as a primary care physician in Connecticut in exchange for each year of loan support.
- Primary care disciplines are defined as family medicine, general internal medicine, geriatrics, and pediatrics.
- All interest and principal will be deferred for three years to allow the program participant to complete postgraduate training in one of the primary care fields noted above.
- Loan Repayment is a 10 year period.
- Students participating in this program will not be allowed to participate in any other program (local, regional or national) that has a service requirement.

Default & Penalties. Sanctions for non-compliance with the Loan Criteria may include:

- Increase in the rate of interest of the balance of the loan to twice the rate of Medical University Loans (MULF, currently the interest rate is 5%); and/or
- Responsibility for all collection costs.

Failure to successfully complete the curriculum of the School of Medicine or fulfill residency training requirements will not result in the participant being in default. However, the interest rate on the loan will revert to the prevailing MULF interest rate.

Criteria for Consideration. In order to be considered for the PCL program, applicants must:

- Be Connecticut residents;
- Be in good academic standing;
- Have demonstrated interest in primary care; and
- Be current medical students in their first, second, or third year.

Applications are reviewed and awards made by a committee of experienced primary care faculty.

Since the inception of the program in 2016, UConn School of Medicine has chosen eight medical students as Primary Care Loan Program awardees. The eight students are spread out among four graduating classes: one student in the class of 2017; four students in the class of 2018; two students in the class of 2019; and one student in the class of 2020.

Cancer Trials

As part of Bioscience Connecticut, capital funds were provided to UConn Health for the specific purpose of expanding cancer clinical trials and advancing patient care in the greater Hartford region. These bond funds are used for capital purchases only, and only for purchases that fulfill the intent of the legislation. Specifically, UConn Health and the other Cancer Centers in the Hartford region purchase equipment and software for the needs of a comprehensive cancer center and Phase 1 clinical trials. Any such equipment purchased with these funds must be available for use, to the extent possible and practicable, by any of the area hospitals for cancer trial purposes.

UConn Health has developed a policy and procedure that outlines how such funds are to be expended to ensure compliance with legislative language and intent, and the process by which other cancer centers in the Hartford region can participate in this initiative. The funding is being used for developing the Phase 1 clinical trial program led by the UConn Health's Neag Comprehensive Cancer Center, but will serve patients throughout the greater Hartford region.

UConn Health has obtained approval by the US FDA to conduct a Phase 1 clinical trial treating women with advanced ovarian cancer with a vaccine developed by Dr. Pramod Srivastava at UConn Health, and such clinical trials have begun at the Neag Comprehensive Cancer Center (Principal Investigator Dr. Susan Tannenbaum). Four patients have already been enrolled in the trial and an additional 11 will be recruited.

Further, as this and additional Phase 1 trials develop, such trials will be available to be opened at other willing sites throughout the Hartford region (e.g., Connecticut Children's Medical Center, Hartford Hospital, Saint Francis Hospital & Medical Center, the Hospital of Central Connecticut, etc.). UConn Health also accepts patients referred to it by anywhere in the community, including from area hospitals, for inclusion in the trials.

Primary Care Institute

Another component of Bioscience Connecticut is the Connecticut Institute for Primary Care Innovation. The Bioscience Connecticut legislation called for the development of a primary care institute located on the campus of Saint Francis Hospital and Medical Center that is intended to increase the number of primary care providers in the state by engaging in research and training to facilitate the effective delivery of primary care.

The Connecticut Institute for Primary Care Innovation (CIPCI: www.cipci.org), has focused on transforming primary care in ways that are palpable and sustainable. CIPCI has been a collaborative enterprise between the UConn School of Medicine and Saint Francis Hospital and

Medical Center. CIPCI moved into the state-of-the-art space on the Saint Francis campus in November 2012.

CIPCI faculty and staff have worked with state and national stakeholders in helping to educate practicing primary care providers, resident physicians and medical student learners. It has served as a resource for primary care leaders, providers, learners, and teams. The Institute has developed and rolled out numerous presentations, workshops and showcases over the past few years. It also maintains a website to support primary care providers.

One major initiative undertaken by CIPCI, "The Primary Care Office of the Future," is an interactive exhibit highlighting novel technologies, innovative workflows, and human-centered design elements that support primary care transformation. Since creating this exhibit in Hartford in 2014, CIPCI has demonstrated the innovative concepts for local and national audiences, inspiring participants to implement new solutions in their practices.

Primary Care Office of the Future Exhibit, 2018

In 2016, 2017 and 2018 CIPCI partnered with the American Academy of Family Physicians (AAFP) to showcase the professional exhibit for at least 5,000 people at its FMX annual meetings in Orlando, Florida, San Antonio Texas and New Orleans Louisiana. CIPCI created engaging videos about transformation concepts and highlighted them on the CIPCI website (https://cipci.org/future).

Many features (Telemedicine, eConsults, Remote Monitoring, Advanced Clinical Decision Support, Team-based care) of the Primary Care Office of the Future are represented in the Primary Care payment transformation efforts underway in the State Innovation Model (SIM) proposal for healthcare reform which is being considered by all of the major primary care groups as well as payors within Connecticut as part of a potential Alternative Payment Model for Connecticut Healthcare reimbursement. Several of the more advanced features are in use currently within some of the training sites for primary care in CT.

Addressing Health Disparities

Bioscience Connecticut established the Health Disparities Institute (HDI) in 2012 to enhance research and the delivery of care to minority and medically underserved populations of the state. In 2017, Dr. Wizdom Powell, PhD, became the new Director of the Health Disparities Institute and Associate Professor of Psychiatry at UConn Health. HDI is located in Hartford.

With new leadership, HDI confirmed its commitment to address root causes of health disparities, advance evidence for action and pursue health equity through research, policy, training and authentic community engagement.

HDI's work has added significant value to our state's efforts to address health disparities: National and international academic, media and congressional audiences have requested presentations on Dr. Powell's research in mHealth to address neighborhood stress, trauma-informed care and men's mental health. HDI's **2018 CT Report Card on Health Equity among Boys and Men of Color**, a first of its kind in the nation, is an advisory tool to develop the Office of Health Strategy Health Enhancement Communities. HDI's **eConsults** health services research, published in Health Affairs this year, represents new evidence for cost savings among Connecticut Medicaid recipients. Findings from HDI's **Measurement of Health Insurance Literacy** will inform the Access Health CT marketplace health insurance plan design process and further optimize the value of health insurance for consumers.

Combined with the efforts of existing faculty and staff, HDI has achieved success in attracting new funding, stimulating dialogue, publishing research, launching partnerships and preparing the next generation of health equity scholars.

The following are highlights of HDI's work in FY 2017-2018 and upcoming 2019 activities:

Research and Fellowship Funding

- 2017 National Institutes of Health (Grant Transfer: $154,223) Neighborhoods, Daily Stress, Affect Regulation, Black Male, Substance Use. PI: Dr. Wizdom Powell
- 2017 CT Health Foundation (Grant Award: $129, 946) Equal Coverage to Care Coalition: Health Insurance Advance Initiative. PI: Victor Villagra, MD
- 2018 Community Health Center, Inc. ($104,468) Health Care Analytical Support Services. PI: Victor Villagra, MD
- 2018 Community Health Center, Inc. ($30,000) Clinical Community Integration Program. Victor Villagra, MD
- 2018 Robert Wood Johnson Foundation ($20,000) Culture of Health Leaders Program Fellowship. PI: Wizdom Powell. Co-PI: Denise Octavia Smith, MBA, CHW
- 2019 CT Health Foundation ($69,000) Equal Coverage to Care Coalition. PI: Victor Villagra, MD

Statewide Reports and Partnerships

- 2018 CT Report Card on Health Equity among Boys and Men of Color: The Report Card is a first of its kind, national model to analyze modifiable poor health outcomes and identify opportunities for effective multi-level interventions to achieve health equity for boys and men of color. HDI uses this Report Card to engage national and statewide stakeholders in interactive system analysis workshops, data walks and town halls with multi-sector participants that disrupt single story data analysis and move from evidence to action. HDI developed this report in collaboration with the CT Department of Public Health and draws on data from national and statewide sources. The HDI CT Multi-Sector Alliance for Health Equity on Boys and Men of Color provided valuable feedback on early iterations of the Report Card, and the Report card has since been presented and discussed in a variety of contexts to support state policy-making and education.

- 2018 CT Multi-Sector Alliance on Health Equity among Boys and Men of Color: The Alliance convenes multi-sector, statewide stakeholders to disrupt harmful narratives, track and monitor data, develop interventions and amplify collective impact to advance health equity for boys and men of color. Launched in the spring of 2018, the Alliance is comprised of more than 15 legislators, CT indigenous tribal nations, healthcare providers, community-based organizations, education and workforce institutions, disability advocates and researchers.

- 2017 Equal Coverage to Care Coalition: The EC2C is a multi-sector, statewide coalition launched in April 2017 to increase health insurance literacy, improve health insurance and health system navigation and identify ways to simply health insurance plan design. With FY 2018 funding from the CT Health Foundation, the EC2C implemented a community-based participatory process in 2018 to develop and pilot test a health insurance literacy Train the Trainer and Community Curriculum for Community Health Workers and Connecticut residents. EC2C also presented health insurance simplification seminars in 2018 to identify high impact levers to simplify health insurance plan design, and received FY 2019 funding from the CT Health Foundation to establish the CT Health Insurance Literacy and Navigation Academy that will transfer our curriculum, reports and resources into plain language videos and training made available to public use and organizational capacity building across our state.

HDI has also published numerous research papers in national publications over the past few years on topics relating to addressing health disparities and health literacy, and has presented its research at national symposia and conferences. This work will continue.

Conclusion

UConn Health is extremely proud of the progress that it has been able to achieve as a result of the Bioscience Connecticut initiative. Because of this support from the Governor and the General Assembly, Connecticut has a public academic medical center that serves the State through excellence in education, patient care, research, and commercialization and technology transfer.

UConn Health is Connecticut's primary source of new physicians and dentists, a key provider of vital health services to some of our most vulnerable citizens, an engine of economic growth, and a partner and thought leader on matters of health policy. We are extremely grateful to the Governor and the General Assembly for its vision and commitment to this initiative.

UConn Health, May 2019