

LETTER TO THE COMMITTEE



The University of Maryland, Baltimore is committed to improving the human condition through leadership in education, research, clinical care, and public service.

We train the professionals who secure the health and well-being of Maryland's citizens and who promote the rule of law. We create the knowledge that cures disease and strengthens communities, locally and globally. We develop the practitioners and innovators who drive discovery and fuel economic growth.

I am grateful to Gov. Larry Hogan and the Maryland General Assembly for their continued support of UMB as we strive to keep Maryland strong. In the pages that follow, you'll see some of the ways in which UMB is expanding efforts to train Maryland's workforce, invigorate its economy, and provide exceptional care and counsel to citizens across the state.

We remain eager to work with you in building Maryland's future — one shaped by knowledge, innovation, and, always, deep compassion.

Sincerely,

A handwritten signature in black ink that reads "Jay A. Perman". The signature is written in a cursive, professional style.

Jay A. Perman, MD
President

WE ARE UMB

The University of Maryland, Baltimore (UMB) is Maryland's public health, law, and human services university. We are a leading U.S. institution for graduate and professional education and a thriving academic health center combining cutting-edge biomedical research and exceptional clinical care.

UMB enrolls more than 6,700 students in six nationally ranked professional schools and an interdisciplinary graduate school. We offer 43 doctoral, master's, and bachelor's degree programs and 19 certificate programs.

UMB is among the country's pre-eminent public research universities, last year attracting \$556 million in grants and contracts — the third-highest total ever recorded by UMB and by any University System of Maryland institution. We are aggressive in commercializing our science, pushing dozens of inventions to the marketplace each year, and launching startups that bring revolutionary ideas to life.

Our growing BioPark is Baltimore's biggest biotech cluster, with dozens of companies and research institutes employing 1,000 people and actively building the city's science community. Our BioPark fuels the commercialization of new drugs, diagnostics, and devices, and catalyzes economic and community development in one of Baltimore's poorest neighborhoods.

UMB occupies 70 buildings over 71 acres in downtown Baltimore, but our academic and clinical footprint extends well beyond the city. We're operating dental clinics for underserved patients in Frederick, Carroll, and Cecil counties. We're expanding primary care access for vulnerable populations in Prince George's County. With University System partners across the state, we're planning to build a regional physician assistant training network, so that these providers can serve their local communities. Last year, we admitted our first class of students to the Family Nurse Practitioner program at the Universities at Shady Grove. We care for hundreds of thousands of Marylanders through health and human services delivery sites across the state.

As one of Baltimore's most powerful anchor institutions, UMB is deeply committed to using its influence and assets to bring greater equity and opportunity to city residents deprived of both — to improve community health, strengthen schools, train the local workforce, and drive neighborhood development.

The people of UMB dedicate themselves every day to the University's abiding mission: *Improve the human condition and serve the public good.*



UMB occupies 71 acres on Baltimore's Westside.

UMB: BY THE NUMBERS

7 SCHOOLS

MEDICINE | LAW | DENTISTRY | PHARMACY | NURSING | GRADUATE | SOCIAL WORK



7,360 FACULTY AND STAFF
6,703 STUDENTS



77%
IN-STATE
STUDENTS

43%
MINORITY
STUDENTS



UMB ENROLLMENT BY RACE/ETHNICITY

American Indian 0.1%

Asian 16.1%

Black 17.7%

Hispanic 6%

Multiple Races 3.3%

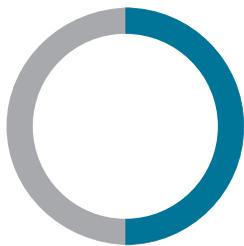
Non-Resident Alien 4.2%

Unknown 1.8%

White 50.7%

Minority students are those who identify as American Indian, Asian, Black, Hispanic, Pacific Islander, or Multiple Races.

In fall 2017, UMB had no enrolled Pacific Islander students.



52%
SHARE OF MARYLAND'S
PROFESSIONAL PRACTICE
DOCTORAL DEGREES
CONFERRED BY UMB



62 DEGREE AND CERTIFICATE PROGRAMS

Professional practice doctoral degrees data: Spring 2016
All other data: Fall 2017

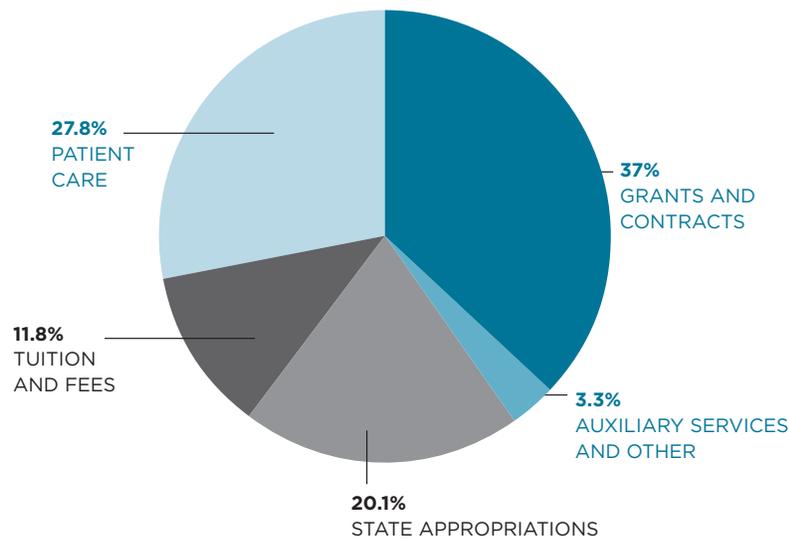
UMB: BY THE DOLLARS

- **18,110** JOBS CREATED
- **\$2.8 BILLION** TOTAL IMPACT ON MARYLAND'S ECONOMY
- **\$139.3 MILLION** STATE AND LOCAL GOVERNMENT REVENUES
- **\$13** UMB'S RETURN ON INVESTMENT FOR EVERY \$1 OF STATE SUPPORT
- **\$1.1 BILLION** TOTAL UMB REVENUE
- **\$556.1 MILLION** GRANT AND CONTRACT AWARDS
- **\$1.1 MILLION** GRANT AND CONTRACT AWARDS PER CORE FACULTY MEMBER
- **68.1%** SHARE OF REVENUE GENERATED BY ENTREPRENEURIAL ACTIVITIES

All data: FY 2016

All data: FY 2017

UMB REVENUE, FY 2017



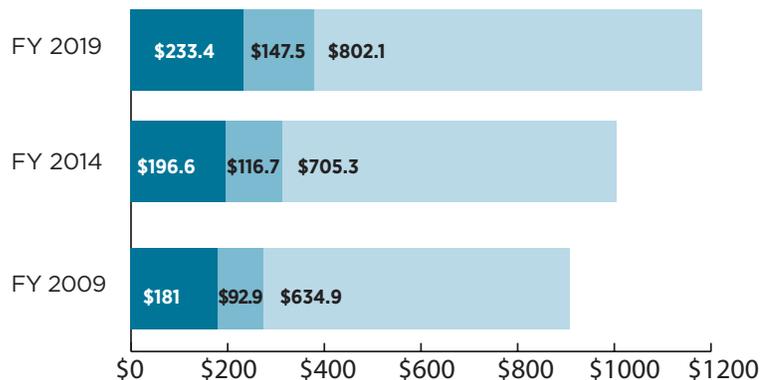
UMB FUNDING TRENDS, IN MILLIONS

- STATE APPROPRIATIONS
- TUITION & FEES
- ENTREPRENEURIAL REVENUES

FY 19 data is based on the FY 2019 General Fund Operating Budget, submitted Jan. 17, 2018, by Gov. Hogan.

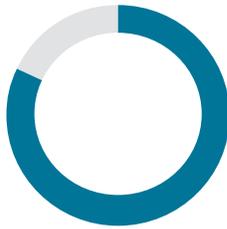
"Entrepreneurial revenues" includes hospital contract, grants and contracts, physician and dental service plans, and auxiliary services.

"State appropriations" includes state general funds and the Maryland Higher Education Investment Fund.

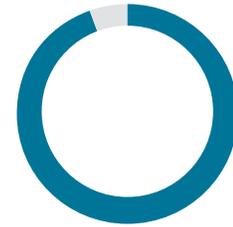


UMB EDUCATES MARYLAND'S PROFESSIONAL WORKFORCE

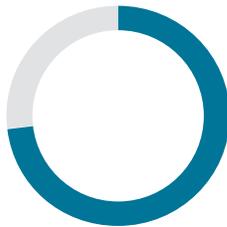
In-state students comprise **77 percent** of UMB's overall enrollment. Many of our graduates are the state's front-line practitioners, tackling Maryland's greatest challenges in health, law, and human services.



**PROFESSIONAL PRACTICE
DOCTORAL DEGREE:**
82.2% IN-STATE
17.8% OUT-OF-STATE
TOTAL ENROLLMENT: 3,081



BACHELOR'S DEGREE:
94.7% IN-STATE
5.3% OUT-OF-STATE
TOTAL ENROLLMENT: 929



MASTER'S DEGREE:
73.3% IN-STATE
26.7% OUT-OF-STATE
TOTAL ENROLLMENT: 2,127

ENROLLMENT BY RESIDENCY

DEGREE PROGRAM	IN-STATE STUDENTS	TOTAL ENROLLMENT
Dentistry—DDS	81.4%	526
Law—JD	70.2%	634
Medicine—MD	87.0%	637
Nursing Practice—DNP	92.0%	473
Pharmacy—PharmD	81.9%	626
Physical Therapy—DPT	85.9%	185
Nursing—BSN	94.4%	850

In the last two years alone, enrollment at UMB has climbed 6 percent. Last year's growth is largely attributable to increases in the nursing practice (DNP), pharmacy (MS), nursing (BSN), and law (MS) programs.

ENROLLMENT TRENDS BY SCHOOLS AND DEGREES

HISTORICAL ENROLLMENT BY SCHOOL

SCHOOL	2007	2012	2017
Dentistry	649	683	642
Law	837	914	778
Medicine	1,247	1,349	1,275
Nursing	1,614	1,713	1,953
Pharmacy	616	752	876
Social Work	921	957	1,036
Graduate—Unaffiliated	n/a	n/a	143
TOTAL	5,884	6,368	6,703

HISTORICAL ENROLLMENT BY DEGREE AND PROGRAM

DEGREE	2007	2012	2017
Bachelor's	810	728	929
Master's	1,838	2,075	2,127
Research & Scholarship			
Doctorate (PhD)	476	480	448
Professional Practice Doctorate	2,693	2,996	3,081
Dentistry—DDS	479	517	526
Law—JD	837	911	634
Medicine—MD	621	663	637
Nursing Practice—DNP	45	81	473
Pharmacy—PharmD	514	644	626
Physical Therapy—DScPT/DPT	197	180	185
Certificate	67	89	118
TOTAL	5,884	6,368	6,703

In 2017-18, 509 UMB students are enrolled in fully online programs offered by the Graduate School and the schools of law, nursing, and pharmacy. Over the past five years, the share of UMB students enrolled in fully online programs has grown from less than 1 percent to nearly 8 percent.

ENSURING TUITION AFFORDABILITY



The topic of college affordability has become increasingly prominent in recent years — with good reason. For undergraduate students, the cost of college attendance jumped 63 percent between 2006 and 2016, while consumer prices overall increased 21 percent. At the same time, median household income nationwide climbed by less than 3 percent.

This affordability problem flows from the undergraduate to the graduate and professional school environment, where education costs are typically far greater. This certainly has an impact on Maryland's workforce and is felt acutely in those fields — for example, allied health — where our demand for professionals outstrips our supply.

Of course, UMB plays a key role in meeting Maryland's workforce demand in health, law, and social work. To continue to do so, we must achieve a level of affordability that allows students from every Maryland region and every income level to take advantage of a UMB education — which means we must define what “affordability” means and provide a mechanism to meet it.

UMB has therefore engaged HelioCampus, a higher education analytics company, to develop:

- a data model that allows rapid, deep, and ongoing analysis of student debt and repayment;
- a set of data visualization tools to estimate affordability under various scenarios after graduation, including job location, salary, professional field, and repayment amounts;
- an overview of gaps in the data and how they might be closed; and
- a road map for future studies to understand affordability.

Preliminary findings show that, in general, UMB's professional programs continue to be affordable. Student debt at graduation has increased in recent years at a slower rate than the cost of attendance. Repayment rates (dollars per year) vary widely by program, but repayment ratios (proportion of debt paid per year) are consistent, typically in the high single digits.

Affordability based on expected wages vs. accumulated debt was fairly idiosyncratic. The interplay of accumulated debt, wages at entry into the workforce, and repayment rate makes it unrealistic to generalize. However, we do know we have one significant challenge: For many graduates, relocating to the lower Eastern Shore or to Western Maryland would be much less affordable than practicing in the high-cost/high-earning areas of Central Maryland.

We already know that this reality produces an unequal distribution of health, law, and human services professionals across Maryland. As a state, we must focus on these geographic gaps in access to high-quality care and counsel, and develop effective policies and incentives that lure UMB's graduates to Maryland's rural and underserved communities.

COSTS AND DEBT BY DEGREE

TOTAL COST OF ATTENDANCE

SCHOOL/DEGREE PROGRAM	TOTAL COST OF ATTENDANCE In-State Students 2016-17 Academic Year
Medicine—MD	\$67,768
Dentistry—DDS	\$81,127
Law—JD	\$58,191
Social Work—MSW	\$42,573
Pharmacy—PharmD	\$56,222
Nursing—MS	\$42,655
Nursing—CNL	\$51,323
Nursing—DNP	\$48,557
Nursing—BSN	\$38,506
Physical Therapy—DPT	\$60,922

Total cost of attendance includes tuition and fees, living expenses, student loan fees, University health insurance, transportation, board exam fees, computer fees, malpractice insurance fees, instruments, books, and supplies.

AVERAGE STUDENT LOAN DEBT

SCHOOL/DEGREE PROGRAM	AVERAGE STUDENT LOAN DEBT All Graduating Students: Spring 2017
Medicine—MD	\$167,965
Dentistry—DDS	\$227,390
Law—JD	\$116,837
Social Work—MSW	\$56,332
Pharmacy—PharmD	\$136,617
Nursing—MS	\$66,021
Nursing—CNL	\$90,082
Nursing—DNP	\$64,110
Nursing—BSN	\$18,908
Physical Therapy—DPT	\$97,384

"Debt" is that acquired through federal and private education loans while attending UMB; figures do not include any debt carried over from students' undergraduate education.

MONTHLY REPAYMENT

GRADUATE AND PROFESSIONAL PROGRAMS	MONTHLY REPAYMENT
Nursing and Social Work	\$648-\$1,037
Physical Therapy and Law	\$1,121-\$1,345
Pharmacy, Medicine, and Dentistry	\$1,572-\$2,617

Monthly payment is calculated at 7.00% interest, with debt to be repaid over 10 years.

The nursing and social work repayment range does not include students earning a Bachelor of Science in Nursing (BSN) degree. The monthly repayment for BSN graduates averages \$218.

CAREY LAW MOVES FORWARD

After several years of national declines in applicants to law school, application volumes at the University of Maryland Carey School of Law have stabilized and begun to increase.

Although many schools, including Carey Law, have shrunk the size of their entering classes, competition for the best students remains intense, and all law schools are providing significant scholarships to the best qualified students. Carey Law has doubled the dollars devoted to scholarships in recent years and has enrolled its targeted number of students. However, with competitors offering significantly more scholarship dollars than Carey Law, it's essential that we continue to increase our scholarship support to cement the progress we've made.

Carey Law's specialty programs — particularly those in health law, environmental law, and dispute resolution — are known for their excellence. Our clinical law program is nationally ranked and prepares graduates to hit the ground running. Our advocacy programs train students in the skills they need to be effective lawyers. And our newest programs in cybersecurity and crisis management are unique in legal education.

The undergraduate MLAW programs — taught by Carey Law faculty to students at the University of Maryland, College Park (UMCP) — have the potential to interest a new generation of students in legal careers and to bring more UMCP students to Carey Law.

JD APPLICATIONS, ENROLLMENT, AND TUITION: CAREY SCHOOL OF LAW

	APPLICATIONS	ENROLLMENT	TUITION
FY 2016	1,733	651	\$16.3M
FY 2017	1,879	623	\$15.1M
FY 2018	2,100	634	\$14.9M

Applications, enrollment, and tuition apply only to students pursuing a JD degree.

"Tuition" is tuition less scholarship dollars.

JD applications for FY 2018 are projected.

UMB TAKES CARE OF CITIZENS STATEWIDE

UMB is Baltimore-based and deeply dedicated to our city, but the University is actually at work across Maryland every day, providing professional education and clinical care and counsel that save and enrich lives — from the Eastern Shore to Western Maryland and everywhere in between.

Serving Vulnerable Patients: Prince George's County

The University of Maryland's Interprofessional Care Transitions Clinic (ICTC) is designed to expand access and continuity of care for Medicare, Medicaid, and newly insured patients discharged from the University of Maryland Prince George's Hospital Center who lack access to primary care providers. The goal is to decrease hospital readmissions and emergency department visits by providing uninterrupted services to complex patients as they undergo transitions in care.

The ICTC, a collaborative effort of UMB's schools of pharmacy and nursing, helps patients connect to providers within the community by combining the work of the clinic (based at the University of Maryland Family Health and Wellness Center in Cheverly), the Governor's Wellmobile, and UMB's e-Health Center. All three programs work together to provide vulnerable patients access to pharmacy, nursing, law, and social services. This integrated, team-based approach has proved effective in keeping patients out of the hospital and in their home communities.

Opened in summer 2017, the ICTC is supported with funds from UMB's schools of pharmacy, nursing, social work, and law; from the Prince George's Hospital Center; from the Governor's Wellmobile; and with \$1.2 million (over two years) from the Maryland Community Health Resources Commission.

Growing Maryland's Primary Care Workforce: Statewide

By the early 2020s, it's predicted the U.S. will need as many advanced practice professionals in the workforce — e.g., nurse practitioners, physician assistants (PAs) — as we need physicians. Especially in rural areas, where these professionals are the most likely providers of health care, there are insufficient training programs to meet community demand.

Since 2015, UMB has partnered with Anne Arundel Community College (AACC) to strengthen Maryland's primary care PA workforce. Students completing the two-year, post-baccalaureate AACC/UMB Physician Assistant Program receive a credential from AACC and a Master of Health Science from UMB.

The AACC/UMB program is competitive, with 900 applicants each year vying for only 40 seats. On average, 80 percent of the program's students are Marylanders, and they remain in Maryland to practice; more than 30 percent of graduates choose to practice in primary care.

In 2016, the program took on 40 additional students from the Eastern Shore, where primary care providers are desperately needed. The last of these students will complete their training at the end of the 2017-18 academic year.

Given the positive results of this collaboration, UMB has requested enhancement funding in FY 2019 to develop a regional PA training network serving the Eastern Shore, Western Maryland, and Central Maryland. By partnering with local programs in these areas — including those in planning with the University of Maryland Eastern Shore, Frostburg State University, and Towson University and the Community College of Baltimore County — we'll increase the state's PA workforce and retain these professionals in high-need regions, for we know that students trained in their home communities are more likely to practice in these communities once their training ends.



Providing High-Quality Oral Health Care: Cecil and Harford Counties

West Cecil Health Center (WCHC) provides health care services to residents of Cecil and Harford counties, regardless of a patient's insurance status or ability to pay. In 2014, with a rising need for dental providers presenting a large gap in dental services for the counties' residents, WCHC expanded its primary care, women's health, and behavioral health services to include a four-chair dental suite staffed by one full-time general dentist and one part-time hygienist. The result was an immediate and overwhelming demand, and within one year, that demand exceeded capacity, creating wait times of six months or more for new patient appointments.

The only other organization in Cecil County offering similar services was a Perryville clinic operated by UMB's School of Dentistry. This clinic opened in 2008 as a 26-chair dental center providing comprehensive care for children and the elderly as well as emergency services for adults. The center offered clinical experiences for dental students (supervised by the school's faculty) and served as a model for other University/community collaborations. Indeed, the School of Dentistry has established similar partnerships with clinics in Frederick and Carroll counties, providing vital oral health services to low-income and uninsured residents.

In 2017, West Cecil Health Center and UMB's School of Dentistry formed a collaboration aimed at increasing access to affordable dental services. This partnership — with funding from the Maryland Community Health Resources Commission and Union Hospital — helps fill the gap in oral health care access by providing the community a 26-chair dental center offering comprehensive, acute, and emergency services. These services, provided on a sliding-fee scale, are delivered to all patients, regardless of their age, insurance, or ability to pay.

Protecting Undocumented Residents: Statewide

With the U.S. Department of Justice cracking down on illegal immigration and a commensurate rise in the detention and deportation of undocumented residents, the Carey School of Law has expanded its Immigration Clinic, making it possible to help a larger number of people in urgent need of advice and assistance. The clinic serves undocumented residents statewide.

Under the supervision of licensed attorneys, students in the Immigration Clinic represent individuals fleeing persecution in their homelands and seeking asylum in the U.S.; those in danger of being deported because of criminal convictions; and those who have been victims of domestic violence or other crimes. Students also assist in bimonthly pro bono consultations with people in removal proceedings, advising public defenders on the immigration-related consequences for their clients.

The clinic has handled a number of cases challenging abusive enforcement practices by the government, and the clinic's students may advocate before the Department of Homeland Security, the Board of Immigration Appeals, the Baltimore Immigration Court, and the federal courts.

Educating Maryland's Nursing Workforce: Capital Region

UMB's School of Nursing is Maryland's largest public nursing program and a leader in educating Maryland's nursing workforce. Nurses make up the single largest segment of the U.S. health care workforce, and Maryland's demand for more (and more highly trained) nurses is acute: The state is one of 16 in the nation — and the only one in this region — projected to have a nursing shortage by 2025.

The School of Nursing has 310 nursing students enrolled at the Universities at Shady Grove (USG) in Montgomery County; enrollment in the Bachelor of Science in Nursing (BSN) program at USG comprises 39 percent of the school's overall BSN enrollment. The USG location, convenient for nursing students from Maryland's Capital Region, also hosts 26 percent of the school's total RN-to-BSN enrollment. This pathway is critical for practicing nurses who want to earn their bachelor's degree — a degree increasingly required for employment and advancement. National survey data indicate that 86 percent of hospital and health care employers prefer BSN-prepared nurses, and 49 percent require BSNs for all new hires.

In fall 2017, the School of Nursing began offering a Doctor of Nursing Practice (DNP) Family Nurse Practitioner specialty at USG. The overall growth of the school's DNP program — up from just 81 students in 2012 to 473 in 2017 — and its expansion to the USG location fulfill state and national recommendations to increase the number of nurses educated at the doctoral level, which is considered essential to reliably providing high-quality, patient-centered care across services and sites.

Dual Admission Serves Nursing Students Statewide

UMB's School of Nursing has a dozen dual-admission agreements — either in force or in development — with community colleges across Maryland. These agreements allow students to complete two years of coursework at a community college, earn their Associate Degree in Nursing, and then transition seamlessly into the School of Nursing's BSN program — either at the UMB campus in Baltimore or at the USG location in Montgomery County.

Dual admission streamlines the path to a BSN. Plus, students' access to upper-level courses in the early years of their nursing education increases their likelihood of success in the bachelor's program.

More than 100 Maryland students have earned, or are pursuing, their BSN through dual admission, and that number will grow dramatically as new dual-admission programs mature and as programs in development come online.

Expanding Access to Social Workers: Baltimore City

In fall 2017, UMB's School of Social Work began partnering with the Enoch Pratt Free Library to meet social work clients where they are and increase their access to government services that can alleviate such challenges as poverty, food insecurity, homelessness, and addiction. Libraries, long embedded in Baltimore's neighborhoods, contain stable and natural support systems for their customers, and serve as a safe place to find answers to questions and to secure resources.

The Social Worker in the Library program places two graduate social work interns in each of four Enoch Pratt branches around the city. The interns work in the library two days a week for eight-month rotations and are supervised by social work faculty. The students provide one-on-one counseling for library clients and train library staff in such areas as crisis management and positive engagement. The students also conduct significant outreach within the library and in the surrounding community to construct a landscape of needs and — with library staff — identify community members who might take advantage of services.

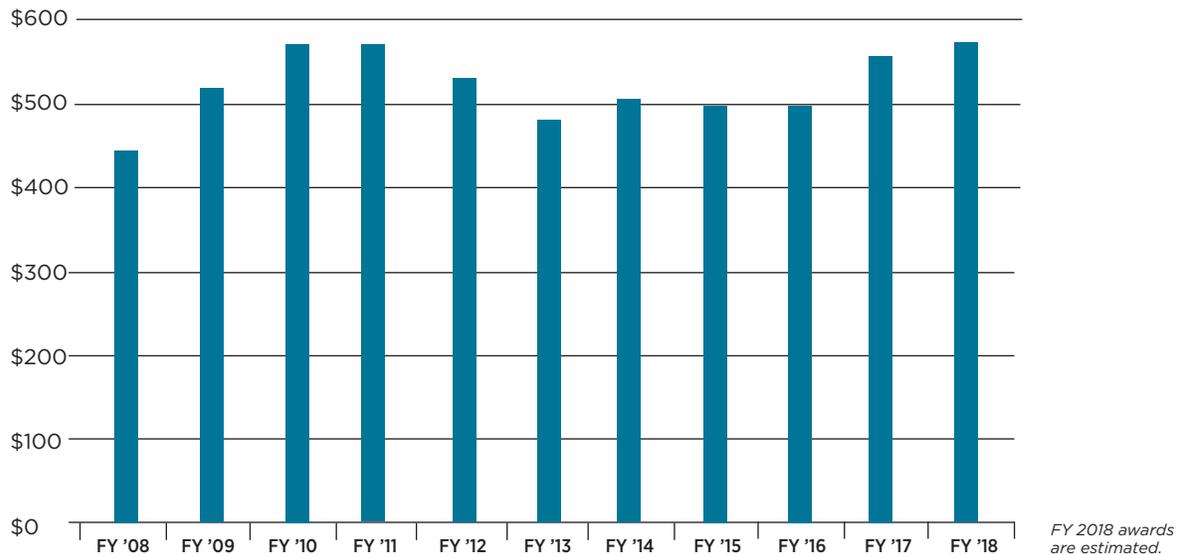
Funding for the program has been provided by the Institute of Museum and Library Services, the PNC Foundation, the Greif Family Foundation, and other philanthropic organizations.

RESEARCH DOLLARS CLIMB AT UMB

In FY 2017, UMB experienced very strong growth in federal, foundation, and corporate research funding, which offset a modest decrease in state-sponsored grants and contracts (G&C). In fact, UMB's extramural funding totaled \$556.1 million in FY 2017, up nearly 12 percent over FY 2016. This is the third-highest G&C total ever recorded by UMB and the third-highest ever recorded by any University System institution.

In FY 2018, we're continuing to see strong growth in federal research funding — from the National Institutes of Health (UMB's largest source of research dollars) and from other federal agencies. As of January 2018, year-over-year research revenues are up 16 percent compared with 2017. This growth is due partially to the imminent opening of Health Sciences Facility III, UMB's newest research building. Some of the renowned research faculty who have been recruited to locate in the building have already started working at UMB, bringing with them significant research grants.

UMB RESEARCH AWARDS, IN MILLIONS



Pioneering Transplantation

In summer 2017, UMB's School of Medicine established the nation's first Center for Cardia Xenotransplantation Research with a \$24 million grant from the Maryland-based biotech company United Therapeutics.

Xenotransplantation involves the transplantation of organs from one species to another. With human organ transplant wait times extending to months — and sometimes years — xenotransplantation researchers are exploring the means to genetically modify and transplant animal organs into humans to eliminate this shortage.

The Transplant Division of the School of Medicine's Department of Surgery has had a longstanding xenotransplantation research program and is considered one of the nation's leading centers for such investigations. The new cardiac xenotransplantation initiative will help UMB expand and accelerate this effort.

ADVANCING CLINICAL TRANSLATIONAL RESEARCH

More than a decade ago, the National Institutes of Health developed a grant program to improve and accelerate the translation of laboratory science into the drugs, devices, and treatments that extend and enrich people's lives. This Clinical Translational Science Award (CTSA) Program helps universities tackle systemwide problems that choke progress in scientific translation; innovate processes that improve the quality and efficiency of translational research; engage patients and communities in every phase of the research; and train the next generation of translational scientists.

Across the country, 64 medical research institutions have won CTSA grants, Johns Hopkins University among them. Last fall, UMB joined in Hopkins's CTSA renewal application. With UMB and Hopkins partnering in this CTSA effort, we can aggregate patient data from both hospital systems to ask research questions in a powerful way. We can link our master's degree programs so that clinical research trainees at UMB and Hopkins gain broader and deeper expertise. We can combine aspects of our clinical research infrastructure to develop not only higher quality programs, but also programs with a more expansive reach across the state.

UMB enriches this project through extensive training and degree programs that complement the CTSA, and through our diverse collection of schools — in health sciences, social work, and law — that serves to increase the application's competitiveness.

This collaboration between Baltimore's two most powerful research institutions is vitally important to the people of Maryland. Together, the University of Maryland Medical System and Johns Hopkins Medicine serve three-quarters of the state's citizens. This alliance will help us build the infrastructure, forge the partnerships, and secure the money that ultimately yield breakthroughs in translational process. Essentially, this is our best opportunity to get more treatments to more patients more quickly.

CTSA awards will be announced in spring 2018.



Dr. Susan Dorsey and Dr. Joel Greenspan, co-directors of UMB's Center to Advance Chronic Pain Research

PUTTING DISCOVERY TO WORK

Academia and industry intersect at UMB. In FY 2017, UMB conducted 582 translational research projects and clinical trials on behalf of 270 corporate sponsors. Since FY 2012, corporate-sponsored research at UMB has more than doubled to \$67 million.

UMB is aggressive in moving our science out of the lab and into the marketplace, where it can have a meaningful impact on human health and well-being. In FY 2017 alone, 40 UMB inventions were licensed to private companies — our highest ever one-year licensing total. Additionally, nine new startup companies — launched with UMB's intellectual property — are raising private capital to accelerate the transition from idea to innovation to impact.

TECHNOLOGY TRANSFER AT UMB

	FY 2012	FY 2016	FY 2017	1-Year Growth	5-Year Growth
Invention Disclosures	131	136	146	7%	12%
Startups	3	10	9	(10%)	200%
Licenses	21	34	40	18%	91%

Improving Health in the Developed and Developing Worlds

PaxVax begins sales of UMB-invented Vaxchora, the only cholera vaccine approved by the U.S. Food and Drug Administration.

Nearly 3 million people around the world contract cholera each year, and without immediate treatment, the disease can cause death within hours. Asia and sub-Saharan Africa account for most of the world's cholera burden. Natural and manmade disasters — which disrupt water and sanitation systems, cripple infrastructure, and displace populations into overcrowded camps — can lead to catastrophic outbreaks. Vaxchora, the UMB-invented vaccine, provides protection with a single dose, making it invaluable for first responders and others traveling to 69 countries with endemic cholera.

UMB startup Remedy Pharmaceuticals sells its stroke therapeutic to BioGen for \$120 million.

Each year, nearly 2 million people in the U.S. and Europe suffer a stroke. There exists a substantial unmet need for new therapies that can improve outcomes in acute stroke, a leading cause of death and long-term disability. The UMB-invented therapeutic targets severe strokes that lead to a disproportionately large share of stroke-related morbidity and mortality. The therapeutic will begin phase III clinical trials in 2018.

Keeping Innovation Economy Jobs in Maryland

UMB startup Harpoon Medical is acquired by Edwards Lifesciences for \$250 million (\$100 million up front).

Harpoon Medical's image-guided surgical tool, invented in the School of Medicine, allows surgeons to repair the heart's mitral valve without opening the patient's chest or stopping the heart. The device, still in development, can dramatically reduce the time needed to perform mitral valve repair — from three to six hours, to less than one.

In an acquisition deal announced in December 2017, California-based Edwards Lifesciences agreed to maintain Harpoon's offices — and jobs — inside Baltimore's Camden Yards warehouse at Oriole Park.

UMB startup Analytical Informatics is acquired by technology giant Philips.

UMB startup Analytical Informatics (AI), launched in the School of Medicine, offers a suite of workflow improvement applications that enable health care providers to enhance performance, monitor progress, and drive continuous improvement. Philips will use AI's technology and analytics tools to help imaging department leaders make data-driven and patient-centered decisions.

AI's employees have joined Philips's offices in Baltimore City.

Immunotherapy startup Living Pharma is acquired by Gaithersburg-based Lentigen Technology.

Living Pharma, spun out of UMB's School of Medicine, is developing a customizable cancer treatment that uses a patient's own T-cells to target tumors. Focusing on CAR T-cell therapy, an emerging form of treatment that uses re-engineered versions of a patient's immune cells to attack cancer cells, the technology could potentially eliminate many cancer types.

Part of UMB's New Ventures Initiative, which fast-tracks the commercialization of promising technologies, Living Pharma moved from a license agreement to acquisition in less than 18 months.



STATE SUPPORT STIMULATES GROWTH

Technology Commercialization

UMB enjoys a close relationship with TEDCO, which is helping accelerate technology commercialization in Maryland. In FY 2017, UMB won 12 competitive grants totaling more than \$1.8 million from TEDCO's Maryland Innovation Initiative (MII) and the Maryland Stem Cell Fund. To date in FY 2018, UMB has won six MII grants for a total of \$725,000.

In addition, UMB participated in two consortia that won competitive grants from TEDCO to build Baltimore's entrepreneurial community. Fellow consortium members are the University System of Maryland, Johns Hopkins University, and Betamore.

In fall 2017, UMB and the University of Maryland, College Park (UMCP) secured a Maryland Department of Commerce grant to establish a Baltimore location of the Fischell Institute for Biomedical Devices. Housed in the BioPark, the institute will bring together clinical expertise at UMB and engineering expertise at UMCP to invent and develop new medical devices.

In winter 2017, UMB device startup Harpoon Medical was acquired by Edwards Lifesciences for \$100 million up front, with another \$150 million to be paid when the company meets prescribed milestones. Harpoon's growth was assisted by various state programs, including MII, the Maryland Venture Fund, and the Biotechnology Investment Incentive Tax Credit. These programs are critical to the success of most UMB startups and BioPark tenants.

In January 2018, the Maryland Department of Commerce supported Paragon Bioservices, our largest BioPark tenant, to enlarge its BioPark facility and expand into a 150,000-square-foot building in Anne Arundel County. These expansions will create 200 new jobs, nearly doubling the employment at Paragon.

Endowed Professorships

The University of Maryland School of Medicine has established six endowed professorships with nearly \$5 million from the Maryland E-Innovation Initiative Fund (MEIF) matching program.

Peter Angelos Distinguished Professorship in Entrepreneurial Surgical Science

This endowment will help the School of Medicine recruit to its Department of Surgery a senior entrepreneurial bioengineer who will lead a new program to develop and commercialize innovative techniques and medical devices that help critically ill people. (\$999,500)

Robert C. Gallo, MD, Distinguished Professorship in Translational Medicine

The MEIF matching funds will enable the School of Medicine's Institute of Human Virology to fully endow the new Robert C. Gallo, MD, Distinguished Professorship at \$2.5 million. The recruited faculty member will advance basic and applied research in HIV/AIDS and other virally linked diseases and accelerate the institute's vaccine development activities. (\$1.1 million)

Dean's Endowed Professorship

The School of Medicine will pursue commercialization of the discoveries made by the Dean's Endowed Professor, bringing new therapeutics to the clinical setting and creating new revenue sources for the school.

In December 2015, Claire M. Fraser, PhD, professor of medicine and director of the Institute for Genome Sciences, was named the inaugural Dean's Endowed Professor. An international leader in microbial genomics, Dr. Fraser has secured more than \$113 million in federal research grant support, holds 23 patents, and is the most cited investigator worldwide in the field of microbiology. Dr. Fraser's research has immense potential for commercialization and for amplifying the work of other investigators in the School of Medicine and at other University System institutions. (\$500,000)

Drs. Angela & Harry Brodie Distinguished Professorship in Translational Cancer Research

This professorship was created to recruit a senior scientist to the School of Medicine and enlarge the impact of the late Angela H. Brodie, PhD, and other investigators at the University of Maryland Greenebaum Comprehensive Cancer Center. The recruited faculty member will pursue new lines of discovery in cancer therapeutics, design new collaborative efforts, and develop new prospects for commercialization. The recruit will lead postdoctoral students and faculty in the school's Department of Pharmacology and at the cancer center. (\$944,000)

Dr. Martin Helrich Professorship in Anesthesiology

This professorship was created to support a leading researcher whose work focuses on discoveries leading to new diagnostic techniques and treatment options in respiratory disease and critical illness. This faculty member's programs already have won significant funding from the National Institutes of Health and U.S. Defense Department, produced numerous industry and university partnerships, and secured generous private philanthropy. (\$850,000)

Dr. Bizhan Aarabi Professorship in Neurotrauma

This professorship will allow the School of Medicine to recruit a faculty member who will sustain the school's leadership in neurotrauma care and research through the R Adams Cowley Shock Trauma Center and the Department of Neurosurgery. By creating partnerships engaged in commercializing new discoveries, the recruit will accelerate the school's progress in improving clinical outcomes for patients suffering spinal cord injury and traumatic brain injury. (\$570,000)



BUILDING A COMMUNITY OF SCIENCE AND STRENGTH

The University of Maryland BioPark is a commercial hub and economic stimulator in Southwest Baltimore and the city's largest biotech cluster. The BioPark accelerates innovation and stimulates industry collaboration at UMB, while creating jobs and investment in one of Maryland's poorest communities.

Over the years, the BioPark has hosted a dynamic mix of medical device, information technology, and pharmaceutical companies, and tenants have ranged from early-stage companies developing innovative diagnostics and therapeutics to multinational corporations fortifying the U.S. arm of their global operations.

The BioPark is visually transforming the neighborhoods west of UMB's main campus with new buildings and green spaces — and with a welcome sense of vitality. UMB's BioPark was named the 2017 Research Park of the Year by the international Association of University Research Parks.

Economic and Community Development

The BioPark's tenants — employing 1,000 people full time — are developing treatments for cancer, autoimmune diseases, autism, and arthritis. One of the park's earliest tenants, Harbor Bank, remains the only retail bank branch in a neighborhood with tens of thousands of residents.

Private developers — including Wexford Science + Technology, the Maryland Proton Treatment Center, and Cross Street Partners — have invested \$470 million in UMB's BioPark, creating thousands of construction jobs. Additional developers have since come on board to renovate neglected buildings and construct new ones — zoned for commercial, residential, and retail use — alongside our BioPark. The Abell Foundation, La Cité Development, and War Horse Cities are now restoring or demolishing dozens of abandoned commercial and residential properties and replacing them with new construction.



University of Maryland BioPark

Workforce Training and Graduate Education

The BioPark collaborates with several local organizations to provide education and workforce training for city residents, and these organizations have space inside the BioPark to deliver their programs.

The Biotechnical Institute of Maryland prepares entry-level biotechnicians to fill vacancies in Baltimore's fast-growing biotech industry. NPower Baltimore helps the city's young people pursue technology careers. The Baltimore City Community College (BCCC) Life Sciences Program enlarges Maryland's health sciences pipeline by preparing students in biomedicine; BCCC students learn in 11 labs and 10 classrooms inside the BioPark and get hands-on experience with the park's community of biotech tenants.

The BioPark houses students from UMB's Graduate School pursuing degrees and certificates in health and social innovation. The University of Maryland, College Park's (UMCP) Smith School of Business has space in the BioPark, and its students are involved in projects that intersect with UMB's interests: economic development, community mapping, intellectual property and entrepreneurship, and small business development. Students in the University of Maryland, Baltimore County's Intermedia and Digital Arts program have studio space inside our newest BioPark property, as do graduate engineering students in UMCP's Fischell Institute for Biomedical Devices. These students work closely with UMB's clinical faculty to bring medical device development closer to practice and to commercialize new technologies.

Community Initiatives

The BioPark is home to the UMB Community Engagement Center and regularly hosts the UMB CURE Scholars (see pages 26 and 29). Its conference center is used by Southwest Baltimore communities for neighborhood association meetings, networking events, ceremonies, and graduations.

The BioPark has donated more than \$1 million to seed local workforce training programs; to buy lab equipment, computers, and books for area schools; to hire high school career counselors; and to place social workers inside the local elementary/middle school and in a nearby low-income housing development. Neighborhood businesses are offered no-cost services through an on-site Small Business Development Center and the Carey School of Law's Intellectual Property and Entrepreneurship Clinic.

The BioPark connects with residents through the significant support and guidance it provides to the Southwest Partnership, a coalition of seven local neighborhoods working to improve quality of life in the community. UMB police patrol the BioPark and provide residents a sense of safety.

A Live Near Your Work Program begun several years ago by the BioPark offers incentives to park employees who buy homes in surrounding neighborhoods. The intent is to build a connected and vibrant community — a *shared* community — without displacing neighbors. The program was the seed of UMB's own Live Near Your Work Program, which offers employees \$18,500 toward a home in Southwest Baltimore.

MPOWERING RESEARCH

The University of Maryland Strategic Partnership: *MPowering the State* is building new infrastructures for joint research between UMB and the University of Maryland, College Park (UMCP), creating more and better opportunities for cross-university research and innovation and, in turn, attracting millions of dollars in new grants.

Over five years, UMB and UMCP have submitted more than 400 joint research proposals, and 115 have won funding – for a total of nearly \$120 million in awards.

	FY 2012	FY 2017	FY 2012-17
Proposals Submitted	4	53	414
Proposals Awarded	1	13	115
Anticipated Award	\$2.9M	\$20.5M	\$119.2M

Center for Sports Medicine, Health and Human Performance

The new Center for Sports Medicine, Health and Human Performance is a high-profile *MPower* project advancing solutions that improve human health and injury recovery while expanding Marylanders' access to world-class sports medicine and occupational health services. The center is a signature component of the conversion of UMCP's Cole Field House into a national model for integrating athletics, academics, and research, and the dedicated center space inside Cole is expected to open in 2019.

Mining UMB's and UMCP's deep expertise in neuroscience, orthopedics, bioengineering, kinesiology, and imaging technology, the center's investigators examine surgical and non-surgical treatment for sports injuries, concussion, and traumatic brain injury (TBI), which accounts for more than 2.5 million emergency room visits, hospitalizations, and deaths each year and whose damage can induce depression, memory loss, impairment in reasoning and communication, and cognitive decline.

With funding from *MPower*, the center has awarded four seed grants to date, supporting joint research into functional mapping of brain activity, spinal cord injury repair, and the effect of TBI on human genes and microbes. Workshops help faculty teams at both universities identify common research interests and initiate collaborations. Recent workshops have explored advancements in neuroimaging; new tools to study brain injury and recovery (biomarkers, wearable sensors, physiological monitoring); and novel approaches to TBI recovery, including diet, exercise, and cognitive training.

MPower leaders are now identifying and purchasing equipment that will support the center's brain research as well as the larger goals of the UMB/UMCP neuroscience community.



The Center for Sports Medicine, Health and Human Performance at Cole Field House

MPOWERING INNOVATION

MPower's joint tech transfer enterprise, UM Ventures, has had enormous success in accelerating the translation of UMB and UMCP research into market-ready technologies and therapies that improve health, wellness, safety, and productivity. Over the last five years, the number of technologies the two universities license annually to commercial partners has nearly doubled. Together, we've launched 35 startups in the last two years, almost double the number launched in the first two years of the program.

This success stimulates Maryland's innovation economy, generating income, investment, jobs — even whole industries — right here in the state.

UM VENTURES: COMMERCIALIZING UNIVERSITY INVENTIONS

	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017	Total FY 2012-17
Invention Disclosures	265	264	366	306	331	322	1,854
Startups	7	11	8	10	20	15	71
Licenses	34	41	51	55	56	66	303

UM Ventures 2.0

UM Ventures got a boost in 2017, with new projects, partnerships, and funding intended not only to advance technology commercialization, but to open up a culture of innovation and entrepreneurship beyond UMB and UMCP — indeed, to build this culture across the University System and throughout Maryland.

Supported with money from the legislature made available through the University of Maryland Strategic Partnership, UMB is offering resources for university innovators — students, faculty, staff, and alumni from all University System institutions — and connecting them to the seasoned entrepreneurs, venture capitalists, and partners who can move their ideas into the marketplace.

UMB's newest BioPark building houses an innovation district — called the Grid — where students, faculty, staff, and entrepreneurs bring ideas to life through education, early-stage funding, and programming. Created by UM Ventures and UMB's Graduate School, the Grid features co-working and collaboration spaces to help innovators develop and test their ideas.

The Grid's on-site resources — an entrepreneur-in-residence, a Small Business Development Center, Carey Law's Intellectual Property and Entrepreneurship Clinic — help new ventures get off the ground. Educational opportunities — workshops, office hours, degree programs in health and social innovation — give novice innovators the knowledge, skills, and contacts they need to grow as entrepreneurs. Pitch competitions, expos, and networking events bring students, faculty, and others into Maryland's rich community of entrepreneurs. In fact, at home in the Grid is b.well, a health informatics company and the first graduate of M-1 Ventures, a startup accelerator launched in 2017 by UM Ventures, Johns Hopkins Technology Ventures, Plank Industries, and other partners.

UMCP's Robert Fischell Institute for Biomedical Devices has space in the Grid. Co-locating the institute in College Park and Baltimore will encourage more device development with UMB's faculty, researchers, and entrepreneurs and with partners across the city. The Fischell Institute in Baltimore is supported with \$100,000 from the Maryland Department of Commerce.

UMB has teamed up with Johns Hopkins University and the University System of Maryland to create Anchor Ventures, an effort to strengthen a citywide cluster of entrepreneurs, startups, and investors. Anchor Ventures will connect Baltimore's technology companies to its academic innovators and build a community that entices Baltimore-based students and entrepreneurs to stay in the city. Anchor Ventures is supported with a grant from TEDCO worth \$125,000. UMB has formed a second and

highly complementary consortium, called Trajectory, with Hopkins and Betamore. Also supported with a \$125,000 grant from TEDCO, this consortium is accelerating the development of select high-tech companies in Baltimore through intensive mentoring and training.

Working hand-in-glove with Anchor Ventures and Trajectory is the Baltimore Fund, a \$1 million fund made available through the University of Maryland Strategic Partnership that provides up to one year of rent subsidies to startups that locate in Baltimore City. The companies can be affiliated with any University System institution, along with Morgan State University and St. Mary's College. The fund promises to create a vibrant city life and act as a magnet for young, creative people who will spark and sustain economic growth.



The Grid, housed in UMB's newest BioPark property



MPOWERING SERVICE

The greatest challenges we confront as a society can seldom be solved by scholars in one discipline alone. *MPower* is bringing together top thinkers — from health, science, law, social science, and human services — to reimagine the problems that plague us and re-engineer their solutions.

SAFE Center for Human Trafficking Survivors



The SAFE Center for Human Trafficking Survivors, opened in College Park in spring 2016, has served more than 50 survivors of sex and labor trafficking. It's the only service provider in the region available to anyone who needs help: There are no restrictions by gender, age, or immigration status. Three-quarters of those served are residents of Prince George's and Montgomery counties, where human trafficking is a thriving — and brutal — industry. The center has a contract with Prince George's County to operate crisis intervention services, case management, and police training.

The SAFE Center offers bilingual comprehensive services, including

no-cost legal and social services, mental health therapy, medical care, and economic empowerment services. Its work is supported with private, state, and federal money. Nearly \$400,000 from the Governor's Office of Crime Control and Prevention expands the availability of direct services to human trafficking survivors and their families, and supports them through the criminal justice process. A three-year, \$1.3 million grant from the U.S. Department of Justice — one of only two of its kind in the country — advances a survivor-centered, coordinated approach to fighting human trafficking.

In partnership with the Prince George's County Human Trafficking Task Force and with the participation of local nonprofits, law enforcement, and the Prince George's County State's Attorney's Office, the center has led a series of meetings to identify gaps in victim services. A plan to fill those gaps is being developed by the center, in conjunction with the county's police department, the State's Attorney's Office, the U.S. Attorney's Office, and human trafficking service providers.

Nine schools from UMB and UMCP are involved in the SAFE Center's work: public policy, social work, law, nursing, public health, behavioral and social sciences, education, business, and arts and humanities. A nine-person full-time staff (including an attorney specializing in immigration issues) is joined by 35 interns from UMB and UMCP who provide client services, develop curricula, and conduct research and outreach.

To respond to the critical needs of the trafficked community, the center is expanding programming to evenings and weekends so that survivors can access crisis services immediately after they're released from law enforcement. Plans are in development to provide specialized services to minors in custody who are believed to be trafficking victims; to begin compiling comprehensive and accurate statistics on the local trafficking trade, which to date has proved difficult; to enlarge the center's portfolio of economic empowerment services (e.g., English literacy programs, job readiness programs, mentoring, vocational training); and to enhance outreach and legal services to survivors of labor trafficking.

Agricultural Law Education Initiative



According to a recent survey, Maryland farmers consider laws and regulations “very important” to the future viability of the state’s agriculture industry. *MPower’s* Agricultural Law Education Initiative (ALEI) connects Maryland farmers to the experts at UMB, UMCP, and the University of Maryland Eastern Shore (UMES) who know what those laws and regulations mean to them, their families, and their farms.

Through its team of legal specialists, ALEI helps farmers understand the laws affecting their operations by conducting outreach while simultaneously building capacity in the private bar around agricultural issues.

To connect Maryland farm families to timely, relevant information, ALEI uses a combination of print media (with regular columns in local agricultural newspapers), online media, and in-person education. In 2017, ALEI legal specialists held 25 training sessions and workshops for farmers across the state and hosted five webinars. They’ve just launched a series of trainings on recall readiness and on-farm food safety; workshops on farm succession planning will roll out soon. Meanwhile, legal publications — in print and in planning — tackle such topics as the hiring of migrant, seasonal, and visa workers; agricultural water law; the Maryland Forest Conservation Act;

aquaculture leasing; nutrient trading regulations; and easements.

The program’s annual Agriculture and Environmental Conference attracts hundreds of farmers, regulators, attorneys, and agriculture professionals who discuss the complex network of environmental regulations that Maryland farmers face and weigh their legal and policy implications.

ALEI made several new hires in 2017: a UMCP-based program coordinator and legal specialists located at UMCP and UMES. These specialists serve as the education co-chairs for the Maryland State Bar Association’s Agriculture Law section.

UMB IS DEDICATED TO BALTIMORE

At the heart of UMB's commitment to improving the human condition are the people we serve in Baltimore, the thousands of men, women, and children who live in the neighborhoods surrounding our 71-acre campus. UMB's neighbors increasingly turn to the University for an array of programs and services designed to dismantle barriers to opportunity. Working together, we can secure the health, well-being, and just treatment of Baltimore's most vulnerable citizens.

UMB Community Engagement Center



The UMB Community Engagement Center (CEC) in Southwest Baltimore provides residents a place to access services that promote neighborhood and economic development. Hundreds of students, faculty, and staff from all seven UMB schools learn and serve at the center, providing vital health, wellness, employment, education, and social services to nearby neighbors, and partnering with them in projects that strengthen community development and invite external investment.

At the center, residents can access after-school programming, workforce readiness training, legal advice, health screenings, mentoring programs, fitness classes, fresh food markets, community meals, YouthWorks summer jobs, and a computer lab.

In 2017 alone, the center welcomed more than 3,000 residents, and while the level of engagement with the CEC varies by client, most are repeat visitors and most access a range of services. In just over two years of operation, the center has recorded more than 17,000 neighbor visits, and the number of residents served during the 2016–17 academic year was nearly double the number served the year before. In 2016–17, the CEC served as a placement site for UMB's professional and graduate students, along with undergraduate and graduate students from UMBC, the University of Maryland, College Park, and Towson University.

The center is now virtually at capacity, struggling to accommodate the residents who use it. UMB is scouting an expanded CEC facility, one that's large enough to accommodate the center's greatest space needs — including youth sports and recreation programming — and that features flexible areas to ensure that our services are able to keep pace with the community's increasing demand and evolving interests.

Economic Inclusion

UMB leverages its institutional purchasing power to support the local economy of Southwest Baltimore. Small but frequent catering purchases are an ideal way to build reliable revenue streams that help neighborhoods retain food businesses that hire local workers, improve local properties, and make food available to community members. UMB's local purchasing program, begun in 2014, is therefore focused on helping community vendors compete for our catering dollars and on growing the local food economy.

We help Southwest Baltimore merchants secure the equipment and systems they need to accept our credit cards and process our payments. We provide technical and marketing assistance, and mentor high-capacity businesses. We help local restaurants enter our supply chain, and we host food fairs on campus, where businesses can connect with University staff responsible for catering purchases.

At the start of the program, UMB spent only \$1,000 a year at food merchants in Southwest Baltimore. In 2017, UMB spent more than \$115,000 in the same small target area. The share of UMB's overall catering dollars spent in this one Southwest Baltimore community jumped from .01 percent in FY 2014 to more than 15 percent in FY 2017.



Promise Heights

The Promise Heights initiative operates in Upton/Druid Heights, a neighborhood just north of UMB, where median household income is \$17,000 a year, and six in 10 children live below the poverty line.

Run by our School of Social Work, in partnership with more than 30 agencies and nonprofits, Promise Heights provides cradle-to-career services for children, young adults, and families. These services are available in all five of the neighborhood's public schools — three elementary, one middle, and one high school — providing wraparound support that stabilizes and strengthens families so that children can succeed.

For instance, parenting classes educate new mothers and fathers about early literacy, childhood brain development, health and

nutrition, safety and discipline, and stress management. The Breathmobile, run by the University of Maryland Medical Center, treats schoolchildren suffering from asthma.

With the United Way, we work to reduce the high mobility rate among poor families, often intervening with landlords threatening eviction. Our nursing school organizes parties that bring parents and children together to learn about healthy habits. Our medical school immunizes children, and our dental school provides oral health care. Our social workers help children and teenagers process the trauma they experience and ultimately break the cycle of violence.

B'more for Healthy Babies

With the Baltimore City Health Department and the Family League of Baltimore, UMB's schools of social work and medicine run B'more for Healthy Babies in Upton/Druid Heights. The neighborhood used to have one of the city's highest infant mortality rates — 15 deaths per 1,000 live births — many of them attributable to unsafe sleeping.

With a sustained safe sleeping awareness campaign targeting the neighborhood's pregnant women and new families, Upton/Druid Heights has had no sleep-related deaths in the past four years. Infant mortality rates overall have dropped to 10 deaths per 1,000 live births, lower than the citywide average. The neighborhood's preterm birth and low birthweight rates have dropped by 24 percent and 18 percent, respectively, and breast-feeding has climbed from 41 to 51 percent.

Renaissance Academy

Renaissance Academy (RA) in Upton/Druid Heights is deeply important to the neighborhood's students and families, who in 2016 were devastated to find the high school targeted for closing by the Baltimore City Public Schools.

UMB worked behind the scenes with school system officials to keep the school open, and arranged for friends of the school to make the case for RA. Promise Heights leaders and the RA community school coordinator (employed by UMB's School of Social Work) coached students as they testified before the Baltimore City School Board and answered board members' questions.

We placed stories in The Baltimore Sun and The Washington Post to attract public support. We worked with the Baltimore Ravens and other corporate sponsors to raise \$1.5 million to renovate Renaissance Academy with new science and art classrooms, a laundry and food pantry, more space for social workers and mentors, and a large student lounge.

Swayed by these efforts — and by the students' obvious devotion — school system officials reversed their decision to close the school, and RA remains open today in Upton/Druid Heights.



Partnership With West Baltimore

In fall 2016, UMB and the University of Maryland Medical Center (UMMC) began implementing a plan to strengthen partnerships among the University, the hospital, and the community to address the considerable needs of West Baltimore, where health and social outcomes are among the worst in the city. With a promise to leverage each other's assets and expertise, the two anchor institutions came together around a vision for a healthy, empowered, socially cohesive, and revitalized West Baltimore.

The plan has four interrelated areas of focus: community health improvement; education and youth development; community connections; and economic and community development. In each focus area, UMB and UMMC have established explicit two-year goals by which we'll measure success.

For instance, in economic and community development, UMB and UMMC have committed to achieve by the end of FY 2018:

1. A 10 percent increase in West Baltimore residents hired in certain UMB/UMMC jobs;
2. A combined catering spend of \$125,000 in targeted city ZIP codes; and
3. A \$140,000 increase in revenues for West Baltimore businesses through the Merchant Access Program, which connects area businesses with each institution's procurement arm.

Goal #2 has already been achieved. Within the target zone (five local ZIP codes that include part or all of West Baltimore, South Baltimore, and Downtown/Seton Hill), UMB and UMMC recorded in FY 2017 a catering spend of \$399,000 — more than triple the combined goal. UMB alone now spends 37 percent of its overall catering dollars in these five ZIP codes.

UMB CURE Scholars Program



UMB CURE Scholar Markia Eubanks

UMB CURE Scholars is an intensive mentoring program, begun in fall 2015, that excites students about science and exposes them to careers in biomedicine. Modeled on a National Cancer Institute (NCI) initiative designed to increase workforce diversity in the health sciences, the UMB program is different from the national program in one important way: UMB CURE Scholars engages students early in their academic careers — starting in sixth grade — and follows them through middle and high school (and beyond) to create a true pipeline experience.

Chosen from three West Baltimore middle schools, the scholars come to UMB's campus several times a week, year-round, for tutoring, mentoring, life and study skills development, and science and social activities. They interact with UMB faculty, staff, and students, and conduct experiments that foster curiosity and build science skills. In 2017, the scholars won national recognition, presenting posters on cancer health disparities at the American Association for Cancer Research in Washington, D.C., and at the NCI headquarters in Bethesda.



UMB CURE Scholar Nicholas Knight

In fall 2017, the program reached its maximum capacity of 80 scholars in grades 6 through 8. The persistence of these scholars is enormously encouraging: UMB's CURE program boasts a 79 percent retention rate for scholars in cohort 1 and a 93 percent retention rate for scholars in cohort 2. Our after-school activity attendance rate is 93 percent, and Saturday attendance is 88 percent. We are monitoring academic progress and see evidence of solid gains: For instance, more than 60 percent of scholars — across all three schools and in both cohorts for which measurement is possible — have improved their standardized math scores.

We have an 86 percent retention rate among program mentors — nearly 250 UMB students, faculty, staff, and friends — which is startling, given that we have significant natural attrition among UMB's graduate and professional students.

Scholars can choose among three curricular tracks: robotics, anatomy, and engineering (undertaken with the Johns Hopkins Applied Physics Laboratory). Upon completion of eighth grade, the scholars are encouraged to attend one of three UMB CURE partner high schools: P-TECH at Dunbar High School, Western High School, and Green Street Academy. These high schools were selected on the basis of their outstanding science and STEM programs.

P-TECH

In fall 2015, Gov. Larry Hogan and then-Baltimore Mayor Stephanie Rawlings-Blake unveiled a local version of the national P-TECH program, which blends high school curricula with college courses and work experience. P-TECH creates a school-to-industry pipeline for students pursuing STEM fields.

Two P-TECH schools opened in Baltimore City in 2016-17. The P-TECH program at Dunbar High School in East Baltimore provides students a college and career pathway in the health sciences. It's supported by UMB, Johns Hopkins University, Baltimore City Community College, Kaiser Permanente, and Baltimore City Public Schools.

By taking credit-bearing college courses beginning the summer after their freshman year, Dunbar P-TECH students can graduate in as few as four years with their high school diploma and an associate degree in physical therapy, nursing, health information technology, or respiratory care.

The P-TECH program is funded entirely by the state, local education agencies, and corporate partners, and is offered at no cost to students and their families. UMB has been a corporate partner to P-TECH since its inception, providing funding and mentoring support. Eight students from UMB's schools of medicine, social work, nursing, and pharmacy serve as mentors to P-TECH students, and eight more mentors are being recruited among UMB's schools.

In spring 2017, P-TECH's entire freshman class took its first annual field trip to the UMB campus, where students explored careers in nursing and pharmacy through hands-on activities and clinical simulations. Dunbar P-TECH is one of three city high schools partnering with our UMB CURE Scholars.

BIG IDEAS FOR OUR BIGGEST CHALLENGES

UMB is developing bold new initiatives addressing some of the most acute challenges faced by the citizens of Maryland and the nation. These efforts are interprofessional and interdisciplinary, so that UMB can leverage the complementary expertise of its seven schools.

Conquering Pain

At least 100 million U.S. adults suffer from chronic — often debilitating — pain, which costs the country about \$600 billion annually in lost productivity. UMB's Center to Advance Chronic Pain Research was formed to unburden patients of their suffering. The multidisciplinary center brings together nationally and internationally renowned clinical and preclinical translational scientists who research the physiological, genetic, and psychosocial reasons why chronic pain conditions develop and persist.

Meanwhile, a team of researchers in our School of Pharmacy has developed a new opioid, known as UMB 425, with great potential to provide pain relief while inhibiting how quickly the body develops a tolerance to the drug. This is a marked departure from standard opioids that — as the body develops a drug tolerance — are prescribed in ever-increasing doses. UMB 425 is as strong as morphine, but with no obvious toxic effects.

Ending Addiction

Working hand-in-glove with the Center to Advance Chronic Pain Research, UMB's Center for Addiction Research, Education, and Service (CARES) is advancing the University's efforts to address the effects of addiction on individuals, families, and communities.

UMB CARES is focused on four areas: workforce development and technical assistance; innovative models and systems of care; translational addiction research, data surveillance, and management; and policy analysis, development, and education. These core efforts are intended to increase Marylanders' access to treatment for substance use disorders, to decrease criminal activity, and to improve the social and psychological health of those suffering from addiction so that they can improve their daily functioning.

Curing Critical Diseases

UMB is committed to helping patients access revolutionary technologies and procedures that reduce the burden of cardiovascular disease worldwide; to moving discoveries in cancer research from the laboratory to the bedside, where they can save and enrich lives; and to eliminating the progressive symptoms of neurodegenerative conditions — such as Parkinson's disease, multiple sclerosis, and epilepsy — through advanced technologies and noninvasive treatments.

Meanwhile, the School of Medicine's Center for Vaccine Development is focused on eliminating vaccine-preventable diseases locally and globally. Its work is saving lives in some of the world's poorest nations and among their most vulnerable populations. The center has created and tested vaccines against cholera, typhoid, non-typhoidal salmonella disease, shigellosis, E. coli diarrhea, influenza, and other infectious diseases.

Embracing Entrepreneurship

UMB is committed to building a vibrant culture of innovation and entrepreneurship at the University, across the University System, and around the state. In winter 2017, UMB opened the Grid, our newest innovation district where students, faculty, staff, alumni, and entrepreneurs — inside and outside UMB and the University System — work together to develop and commercialize their ideas and inventions.

On-site resources — like an entrepreneur-in-residence, a Small Business Development Center, and an Intellectual Property and Entrepreneurship Clinic — are designed to help ventures get off the ground.

UMB's Graduate School has built an academic component to the Grid: a master's program and certificate program in Health and Social Innovation. The programs' students will use business principles, market research, and design-thinking to explore complex health and social challenges. They'll design and develop projects, iterate and test their ideas — be they new policies, processes, or technologies — and connect with Baltimore's community of leaders and entrepreneurs to take those ideas all the way to impact.

IP and Entrepreneurship Clinic

The Carey School of Law's Intellectual Property and Entrepreneurship Clinic provides pro bono assistance with a broad range of intellectual property (IP) and business law issues, and gives Maryland startups, small businesses, and individuals access to vital services they might not otherwise be able to afford.

Recently selected to participate in the U.S. Patent and Trademark Office's Law School Clinic Certification Program, the clinic allows student attorneys to help build and protect clients' IP portfolios. Students advise clients on the patentability of inventions, prepare patent applications, draft IP licensing agreements, file trademark applications and copyright registrations, and counsel clients on protecting trade secrets.

A recent expansion of the clinic allows student attorneys to provide clients essential corporate and business law services — e.g., assistance with forming new companies, drafting charter documents and founder agreements, and securing nonprofit and benefit status. The clinic consults on operational issues, such as service contracts and strategic relationships, and advises client companies on proposed financing arrangements.

Operating out of two locations — the Grid, housed in UMB's BioPark, and Mtech, housed in UMCP's Clark School of Engineering — the clinic is a go-to resource for Maryland's thriving community of academic and business innovators.