

MARYLAND LIFE SCIENCES
ADVISORY BOARD

ANNUAL STATUS REPORT
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Economic Development Article, Section 3-205

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Introduction

Pursuant to § 3–205 of the Maryland Economic Development Article, The Maryland Life Sciences Advisory Board (LSAB) presents the following report to the Governor and, in accordance with § 2–1246 of the State Government Article, to the General Assembly. The report includes a summary of the activities of the LSAB during the preceding year, FY2015.

Life Sciences in Maryland

The Life Sciences sector in Maryland plays a significant role in Maryland's economy, with the added benefit of improving health and well-being of Marylanders and people around the world. There are now more than 500 life science companies in Maryland that employ more than 33,000 people – This reflects a 25% growth from the 2009 estimate of only 400 companies in the State. Most of these companies employ an average of ten people and, due to the length of FDA approval cycles, are pre-revenue. However, these companies attract hundreds of millions of dollars in angel and venture capital investment and federal SBIR/STTR grants, all of which benefit Maryland's economy.

Including the federal, academic and private industry sectors, the life sciences sector directly accounts for 71,600 jobs, or 3% of all jobs in Maryland, at an average annual salary of \$91,100 (see *Appendix B*). Maryland has over 1,700 private sector establishments directly involved in life sciences work, and 6% of Maryland's Gross Domestic Product is generated by the life sciences. According to ***Life Sciences Maryland: Jobs Analysis and Economic Impact Report 2011***, more than 160,000 jobs in the State are directly and indirectly related to life sciences generating \$9.6 billion in salaries and providing \$500 million in income and sales tax support annually to the State. One-third of Maryland's job gains during 2002-2010 were in the life sciences sector.

Life Sciences Advisory Board Background

The LSAB was established on May 9, 2007, to assist in maintaining the preeminence of Maryland's life sciences industry. The Life Sciences Advisory Board was established to assist the Department in:

- Developing a comprehensive State strategic plan for life sciences;
- Recommending ways to address critical needs in the life sciences;
- Developing a strategy to attract private sector investment in the life sciences;
- Promoting life sciences research, development, commercialization, and manufacturing;
- Promoting collaboration among industry, academia, and government;
- Supporting collaboration with federal life sciences facilities located in the State;

Board Membership (See Appendix A for the list of FY2015 LSAB members.)

The LSAB's membership includes the Secretary of the Maryland Department of Business and Economic Development, a representative designated by the Maryland Technology Development Corporation (TEDCO), and 16 members appointed by the Governor. These 16 members are comprised of:

- (i) Three representing federal agencies located in the State with life sciences missions;
- (ii) Seven with executive experience in life sciences businesses located in the State, at least four of whom represent small businesses;
- (iii) Four representing institutions of higher education located in the State, one of whom shall represent a community college;
- (iv) One with general business marketing experience in a life sciences business located in the State; and
- (v) One member of the general public.

Summary of FY 2015 Activities

During FY2015 DBED, with the guidance of the LSAB, provided funding supporting a number of biotechnology development initiatives. These included:

Biotechnology Development Awards

Since its inception in 2010, more than \$8.3 million has been awarded through DBED's Biotechnology Development Awards program to advance 48 Maryland life sciences projects. Three previous awardees – Gliknik, Telcare, and Unither Virology – collectively have raised more than \$130 million after using their biotechnology development award funds to advance the early stages of their technology. During FY2015, \$864,959 in commercialization funding was awarded, on a competitive basis, granted to advance technology at five companies and one university:

Brain Biosciences, Rockville

Developing a compact, portable PET scanner for the evaluation of patients with suspected Alzheimer's or other neurodegenerative disorders. (\$100,000)

Graftworx, Bel Air

Developing a "smart" stent/bypass graft that automatically alerts clinicians of critical events before they occur so that cost effective, early intervention replaces emergency procedures. (\$200,000)

JPLC Associates, Baltimore

Developing a device, the "Raven" which integrates optical, mechanical, and radiation quality assurance parameters for radiation therapy equipment. (\$99,959)

Mindoula Health, Silver Spring

Developing a telehealth platform enabling virtual and in-person 24/7 behavioral health case management services and collaborative care. (\$200,000)

Vixiar Medical, Annapolis

Developing of a non-invasive device to monitor CHF that guides the patient through a 10 second process to assess cardiac filling pressures. Output is used at point of care or as a “gold standard” input to remote diseases management. \$200,000

Dr. Qinones-Hnojosa, Dr. Jordan Green, Johns Hopkins School of Medicine, Baltimore

Developing a biodegradable nanoparticle therapy enabling effective transfection of patient’s stem cells derived from adipose tissue that are applied directory to the post-operative site of brain cancer.

Invest Maryland Challenge

DBED supported the life sciences track of the Invest Maryland Challenge with a \$100,000 prize awarded to University of Maryland, Baltimore spinout Harpoon Medical. *Harpoon Medical* is developing a non-invasive method to perform mitral valve repair. The company’s medical device now is in patient trials.

Ebola

As the Ebola crisis peaked during the winter of 2014-2015, DBED tracked a number of Maryland-based companies, academic and federal research organizations involved in the development of treatment and prevention technologies. These include: *The University of Maryland, Baltimore, Johns Hopkins University, the National Institutes of Health, Ft. Detrick, the U.S. CBRNE Command at Aberdeen Proving Ground, Emergent BioSolutions, Immediate Response Technologies, Profectus BioSciences, and Zalgen Labs.*

In early 2015, *Zalgen Labs* received a \$20,000 grant, matched by Montgomery County, to support the testing of Ebola diagnostic technology in Africa. Zalgen Labs’ technology subsequently was approved as the first rapid test for Ebola by both the FDA and the *World Health Organization*. DBED also contributed to an Ebola Design Challenge at *Johns Hopkins University* hosted by JPIEGO. Students designed improved protective clothing and subsequently licensed their innovations to Dupont.

DBED in partnership with the Maryland Emergency Management Agency (MEMA); the Governor’s Office of Community Initiatives (GOCI); the International Orthodox Christian Charities (IOCC); and LIFT, a not-for-profit logistics provider, coordinated an effort facilitating donations of surplus lab materials and other supplies from Maryland companies and research institutions of medical supplies which could be used by health workers in Africa. *Emergent BioSolutions, the University of Maryland, and Creatv Microtech*, all contributed to this effort.

Biotechnology Investor Incentive Tax Credit

During FY2015, DBED processed biotechnology investor incentive tax credits related to investments in eighteen Maryland qualified biotechnology companies totaling \$11,679,435. The investments per company ranged in amounts from \$31,038 to \$1,720,750. Since the program began in 2007, \$68M in credits have been awarded to investors in 82 early stage biotechnology companies which subsequently have raised more than \$500M in follow on funding.

Maryland Venture Fund

During FY2015, several investments in Maryland biotechnology companies were approved and/or settled:

Approved - MVF InvestMD II Enterprise

8/4/2014	Harpoon Medical, Inc.	\$1,500,000	Queen Anne's (7 jobs)
6/11/2015	GraftWorx, LLC	\$ 500,000	Harford (3 jobs)

Settled - MVF InvestMD II Enterprise

8/19/2014	Harpoon Medical, Inc.	\$ 500,000	Queen Anne's
2/23/2015	GrayBug, LLC	\$ 240,000	Baltimore City

Faculty Innovation

Faculty researchers from the University of Maryland, Baltimore and Johns Hopkins University and entrepreneurs building companies based on technologies from these institutions were recognized at the April 2015 Joint Meeting of the *Johns Hopkins Alliance for Science and Technology Development* and the *University of Maryland, Baltimore Commercial Advisory Board* for their groundbreaking research with \$200,000 in prizes. \$100,000 of this award funding was contributed by the Abell Foundation, \$25,000 from each of the institutions, and \$50,000 from the BioMaryland Center.

DBED's \$25,000 grants were awarded to startup companies affiliated with Johns Hopkins and the University of Maryland, Baltimore:

Sonavex Surgical, Baltimore

A spinout of Johns Hopkins University developing a system to improve post-operative vessel clot detections, minimizing the chance of surgical failure.

Analytical Informatics, Baltimore

A University of Maryland, Baltimore spinout developing innovative health IT solutions for clinicians initially focused on radiology.

Business Assistance

In FY2015, DBED staff met with 96 early stage companies to provide business plan feedback and provide information regarding resources in the State to support their business growth. 48 companies also made 86 visits to the

BioMaryland Center to access proprietary market research to assist them with their applications for funding and investment pitches.

During FY2015, DBED staff also met with an additional 42 biotechnology companies to discuss site location, funding and other resources.

Promotion

Part of DBED's support of the biotechnology industry in Maryland has been to promote and raise the profile of companies and innovative research taking place in the state, and to connect innovators with potential collaborators, clients and partners domestically and abroad.

MEDICA 2014

In November 2014, DBED hosted an exhibit at MEDICA, an annual B2B conference for healthcare companies with 130,000 attendees which featured Maryland companies seeking to do business overseas:

BioElectronics (Frederick County) developing advanced drug-free consumer medical devices;

Clear Guide Medical (Baltimore City) specializing in developing guidance systems for ultrasound-based medical interventions;

Dimetek Digital Medical Technologies (Montgomery County), developer of a portable ambulatory ECG device;

Get Real Health (Montgomery County) specializing in patient engagement and connected care solution;

Gould Technology LLC (Anne Arundel County) manufacturing passive fiber optic products;

IOB Medical, Inc. (Montgomery County) manufacturing medical devices for the women's healthcare industry;

MedServ, International (Montgomery County) manufacturing endoscopes and surgical instruments; and

Tetracore, Inc. (Montgomery County) specializing in the development and manufacture of diagnostic assays and devices for the detection of biothreat agents, veterinary and human diseases.

A number of the companies attending MEDICA were able to take advantage of the Export MD grant to support their travel.

BIO 2015

DBED Deputy Secretary Benjamin Wu led the Maryland delegation to the BIO2015 International Conference in Philadelphia, PA. 15,000 attendees participated in the Conference sponsored by the Biotechnology Industry Organization (BIO), chaired by GlycoMimetics (Gaithersburg) CEO Rachel King. Deputy Secretary Wu hosted a breakfast for 100 Maryland biotechnology leaders at the conference and also held more than a dozen separately scheduled meetings with Maryland biotechnology leaders. Deputy Secretary Wu spoke with a delegation from China, a prospect from Virginia and also presented certificates of recognition to two high school students, winners of Maryland's BioGENEius competition.

DBED's presence included a 2,000 square foot pavilion with exhibit space for fifteen Maryland companies and displays featured eleven biotechnology innovators. DBED staff provide exhibit hall and partnering passes not only to the exhibitors and featured innovators but also to 29 additional company representatives from Maryland.

During FY2015, DBED staff also made connections and promoted State resources at 98 networking events hosted by 49 organizations throughout Maryland.

News regarding Maryland biotechnology companies, job opportunities and events was published by DBED staff in twenty-one issues of the BioMaryland News and Events newsletter distributed to more than 5,000 subscribers. Related information also was promoted through a BioMaryland twitter handle whose followers increased during the year by 50% from slightly over 1000 during the year to 1545.

One of the most popular promotional pieces in the Department is DBED's annual print directory of the 500 biotechnology companies in Maryland. This directory also is available with more detail per company and a company search capability on the DBED website.

Life Sciences Advisory Board Activity

The LSAB held two meetings in FY 2015, each coordinated by the Maryland Department of Business and Economic Development (DBED):

The first meeting, held at the World Trade Center in Baltimore on July 30, 2014 focused primarily on DBED's activities at the summer Bio International Conference (BIO 2014) in San Diego, where Department coordinated a 2,000 square foot pavilion promoting Maryland biotechnology innovators, universities, economic development partners and site/location opportunities. At BIO 2014, DBED with Medicen Paris announced a joint international funding project in which Rockville, Maryland's Opticul Diagnostics and Brittany, France's Diafir each contributed \$200,000 matched by the BioMaryland Center and BPI France to co-develop a point of care device for bacteria detection in burn wounds. The Maryland Pavilion at BIO 2014 also provided a venue for the State's regional economic development partners to showcase their regions and for eight biotech innovators to present projects which had been funded by DBED. The Department enabled these companies to attend the conference and to participate in 50+ partnering meetings with potential collaborators, partners and investors.

The LSAB also met on October 28, 2014 at The Science and Technology Park at Johns Hopkins University. The board members learned about two new State programs, the E-Innovation Initiative and RISE involving nonprofit and higher education institutions and economic development related funding. Representatives

from Johns Hopkins University, UM Ventures and BioHealth Innovation updated the LSAB on their activities supporting biotechnology commercialization; and representatives from groups, NIH and Ft. Detrick shared information regarding the work their organizations addressing the Ebola outbreak.

Summary

Maryland has unique assets underlying its status as one of the nation's leading life sciences clusters. The State is home to the world's largest medical research organization, the National Institutes of Health (NIH); the Johns Hopkins University, the University of Maryland, the Frederick National Lab for Cancer Research, the U.S. Army Research Institute for Infectious Diseases, and numerous other federal, nonprofit and academic research organizations. Many of the 500+ biotechnology firms in the State are working to commercialize technologies first developed in these research organizations. This translational research supported by a highly educated workforce has resulted in Maryland's leadership role in many areas of the life sciences, including genomics and personalized medicine, vaccines and immunotherapeutics, medical devices, diagnostics and regenerative medicine. The State's healthcare expertise and innovative culture also have made it a leader in Health IT with a growing number of companies focused on developing products which leverage technology and patient generated data to improve healthcare while lowering costs.

With the business growth strategy set forth by the Department of Commerce and the guidance of the LSAB, the State is uniquely positioned to leverage its life sciences and health related research and private sector technology development activities, location and strong workforce assets, in a way that will continue to benefit not only Maryland residents but also the global community.

Appendix A

2014 Life Sciences Advisory Board Members

Chair: Ms. Rachel King, *Chief Executive Officer, GlycoMimetics, Inc.*

Standing: Mr. Dominick Murray, *Secretary, Maryland Department of Business and Economic Development (DBED)*

Mr. Rob Rosenbaum, *President and Executive Director, Maryland Technology Development Corporation (TEDCO)*

Appointed:

Dr. Eddy Agbo, *Chairman and CEO, Fyodor Biotechnologies Corporation*

Dr. Kimberly Brown, *CEO, Amethyst Technologies*

Dr. Stephen Desiderio, *Director, Institute for Cell Engineering, Johns Hopkins School of Medicine*

Dr. Thomas Hyde, *COO, Lieber Institute for Brain Development*

Mr. Mark A. Mlynarczyk, *Senior Director, Executive External Relations, Medimmune*

Dr. Karen E. Nelson, *President, J. Craig Venter Institute*

Dr. Kathleen Kenedy Norris, *Director of Life Sciences Institute, Coordinator of Biotechnology, Baltimore City Community College*

Mr. Ted Olsen, *President, PathSensors, Inc.*

Dr. Patrick G. O'Shea, *Vice President for Research, University of Maryland, College Park*

Dr. Jay A. Perman, *President, University of Maryland, Baltimore*

Dr. Mark Rohrbaugh, *Director, Office of Technology Transfer, NIH*

Mr. David W. Smith, *Business Director, Lonza Walkersville, Inc.*

Col. Andrea Stahl, Ph.D., *Deputy Commander, US Army Medical Research Institute of Infectious Diseases (USAMRIID)*

Mr. Ryan Sysko, *Founder and CEO, WellDoc, Inc.*

Dr. Frank F. Weichold, *Director, Office of Critical Path and Regulatory Science Initiatives, Office of the Commissioner, US Food and Drug Administration*

Appendix B

Table 1: MD's 71,618 life sciences jobs are in the private sector, federal government and academic institutions – 3% of all jobs in Maryland

Maryland Life Sciences Jobs, Wages and Salaries			
Group	Jobs	Aggregate Wages & Salaries	Average Annual Salary
Private Sector	33,602	\$3,058,887,640	\$91,034
Federal Government	29,777	\$2,772,774,686	\$93,118
Academic	8,240	\$692,744,795	\$84,074
Total	71,618	\$6,524,407,122	\$91,100
Source: DBED analysis on data from the Maryland Department of Labor, Licensing and Regulation and Bureau of Labor Statistics. Published in <i>Life Sciences Maryland: the Jobs Analysis & Economic Impact Report 2011</i>			

Table 2: MD's private sector life sciences jobs are found largely in research, testing and medical laboratories

Maryland Private Life Sciences Jobs, Salaries and Facilities 2010				
Subsector	Employment		Facilities or Establishments	Average Annual Salary
	Jobs	Share		
Agricultural Feedstock and Chemicals	256	0.8%	22	\$63,780
Drugs and Pharmaceuticals	6,574	19.6%	65	\$102,084
Medical Devices and Equipment	1,962	5.8%	86	\$67,612
Research, Testing and Medical Laboratories	24,810	73.8%	1,579	\$90,239
Total	33,602	100%	1,752	\$91,034
Source: DBED analysis on data from the Maryland Department of Labor, Licensing and Regulation and Bureau of Labor Statistics. <i>Life Sciences Maryland: the Jobs Analysis & Economic Impact Report 2011</i>				