

*“Science is a series of judgments, revised without ceasing.”*  
Pierre Emile Duclaux (1840-1904), French biochemist, bacteriologist

*“If I have seen further than others, it is by standing upon the shoulders of giants.”*  
Isaac Newton (1643-1727), English physicist, mathematician, astronomer, philosopher

## **Economic Benefits of Maryland’s Stem Cell Program already Apparent**

### Largest gains still to come

Stem cell research stands at the cutting-edge of the New Economy. Embryonic stem cells were first discovered in 1998 by Dr. John Gearhart of the Johns Hopkins University and by Dr. Jamie Thomson of the University of Wisconsin. Because of controversies revolving around the role of embryos in research, progress within stem cell science has been frustrated until recently due to limitations placed upon federal funding.

More recently, a combination of factors including a growing awareness that stem cell research is far broader than embryonic research, a shift in the political environment, and concerns regarding U.S. research and innovation market share has created a policy climate more conducive to stem cell research-based innovation. Indeed, on March 9, 2009, President Barack Obama signed an Executive Order expanding federal funding for stem cell research.

This should be viewed as particularly good news for Maryland. The State of Maryland has been one of the leaders in terms of supporting stem cell research along with California, Connecticut, Massachusetts and a small handful of other states. In June 2008, Governor Martin O'Malley introduced his signature \$1.3 billion BIO 2020 Initiative, which included \$20 million per year for stem cell research for the next ten years. The initiative is intended to build upon Maryland’s already formidable presence within the life sciences industry. According to available data, Maryland:

- ranks first among the 50 states in per capita academic bioscience R&D (FY 2006) and second in per capita National Institutes of Health (NIH) awards (FY 2007);
- ranks second among the 50 states in terms of the number of workers employed in bioscience occupations per million population (FY 2006);
- ranks second in bioscience higher education degrees awarded per capita (2006); and
- ranks third in bioscience venture capital investments per capita (2002 to 2007).<sup>1</sup>

Because of Maryland’s early support for the stem cell research industry, more researchers are here than would otherwise be the case, which positions the state to capture a larger share of federal research dollars going forward. Moreover, because of Maryland’s head start vis-à-vis other states, knowledge formation will be more rapid in the Free State than among late entrants.

Unfortunately, because of Maryland’s near-term budgetary concerns, there has been discussion in Annapolis and elsewhere that support for this cutting-edge industry should be reduced, perhaps significantly. Not only would this limit future economic gains emerging from the industry, it would limit Maryland’s future capacity to attract federal dollars and would also reduce the long-term rate of return on monies already invested due to the cumulative nature of scientific endeavors.

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<sup>1</sup> World Stem Cell Report 2009. Genetics Policy Institute. October 2009.

Measuring economic impact of Maryland’s stem cell program to date

The State of Maryland took a step toward life sciences supremacy with the passage of the Maryland Stem Cell Act of 2006. Among other things, the Act created the Maryland Stem Cell Research Commission (MSCRC), which in partnership with the Maryland Technology Development Corporation (TEDCO) awarded \$38 million in grants to various research projects during calendar years 2007 and 2008. Many of these grants (about two-thirds) were provided to researchers at Johns Hopkins University, who received 53 grants in 2008. The table below summarizes calendar year 2008 research grant-making activity.

Exhibit 1. MSCRF Awarded Research up to FY2008

<i>Type of Research Grant</i>	<i>Grantee (Number of Grants)</i>	<i>Projected Budget</i>
Exploratory Research <sup>2</sup>	Johns Hopkins University (31)	\$7,122,722
	University of Maryland, Baltimore (8)	\$1,774,750
	University of Maryland (4)	\$920,000
	University of Maryland Biotechnology Institute (4)	\$909,420
	University of Maryland, College Park (2)	\$459,792
	<i>Total Explorer Research (49)</i>	<i>\$11,186,684</i>
Investigator-Initiated <sup>3</sup> Research	Johns Hopkins University (11)	\$15,079,127
	University of Maryland, Baltimore (4)	\$4,404,008
	University of Maryland Biotechnology Institute (1)	\$1,724,988
	Retro Therapy, LLC.	\$890,0362
	Kennedy Krieger Institute (1)	\$751,699
	<i>Total Investigator-Initiated Research (18)</i>	<i>\$22,850,184</i>
Post-Doctoral Research <sup>4</sup>	Johns Hopkins University (13)	\$1,210,000
	University of Maryland, Baltimore (2)	\$220,000
	<i>Total Post-Doctoral Fellowship Research (15)</i>	<i>\$1,430,000</i>
<b>Total All Types (82)</b>		<b>\$35,466,868</b>

Source: Maryland TEDCO & MSCR Commission

- Without stem cell research support, 514 more Marylanders would be searching for work

To determine the economic impact of the grants received in 2008, Sage Policy Group, Inc. utilized IMPLAN modeling software version 3.0 to estimate multiplier effects associated with support to research and innovation. Based on Sage’s modeling, the grants made in calendar year 2008 supported more than 500 jobs in Maryland statewide. These jobs were associated with more than \$34 million in income, which translates into more than \$64,000 per job. This is particularly impressive since many of the induced jobs take the form of jobs in retail services and services to households. Area businesses benefited

<sup>2</sup> Exploratory Research: designed for investigators who are new to the stem cell field and for exploratory projects without preliminary data with maximum amount of \$100,000 a year, for up to two years.

<sup>3</sup> Investigator-Related Research: designed for investigators with preliminary data supporting the grant application with maximum amount of \$300,000 a year, for up to five years (updated from the first two years at the request of Investigators and approval of the Commission).

<sup>4</sup> Post-Doctoral Research: designed for exceptional pre-doctoral students and post-doctoral fellows who wish to conduct post-doctoral research on human stem cells in the State of Maryland with maximum support of \$55,000 a year, for up to two years.

to the tune of \$71 million in 2008, which implies a multiplier on spending of approximately two to one. Of course, these estimates do not take into account all of the benefits that will be derived through innovation in the future or the prospective benefits to human health.<sup>5</sup>

Exhibit 2. Economic Impact of MSCRF Grants Awarded in 2008

<i>Type of Impact</i>	<i>Employment</i>	<i>Labor Income (\$millions)</i>	<i>Business Sales (\$millions)</i>
Direct	250	\$21.8	\$35.5
Indirect	104	\$5.5	\$14.9
Induced	160	\$6.8	\$20.9
Total	514	\$34.1	\$71.3

Source: Sage

- State and local government finances augmented by nearly \$3 million per annum

Though still in its infancy, grant making to stem cell researchers in Maryland is already beginning to produce meaningful effects. In 2008, the industry was able to “return” nearly \$3 million to State and local government coffers through greater support for income generation, retail activity and property tax payments. As research increasingly becomes commercialized, impacts are expected to expand briskly, with economic and fiscal impacts potentially doubling every three years.

Exhibit 3. State and Local Fiscal Impact of MSCRF Grants Awarded up to 2008

<i>Type of Tax</i>	<i>Fiscal Impact (\$millions)</i>
Sales Tax	\$0.7
Income Tax	\$1.3
Property Tax	\$0.7
Total State/Local Tax Impact	\$2.7

Source: Sage

### Conclusion

The State of Maryland is now beginning to enjoy significant returns from its early commitment to stem cell research. Because of the cumulative aspect of scientific knowledge, these returns are expected to multiply over time, translating into more rapid commercialization, greater support for jobs, income and tax collections. As an indication of the pace of industry expansion, the number of applications requesting Maryland grant funds expanded from 85 applications in FY2007 to 147 applications just two years later. There were 193 Letters of Intent in FY2010.

For Maryland to fully benefit from investments that have been made, industry support must continue, particularly in light of expanding federal support for stem cell research. Maryland’s early adopter strategy positioned it to capture a larger share of federal dollars, but withdrawal of support will lead to a loss of local scientific capacity, access to federal grants, and associated economic impact.

<sup>5</sup> Calendar 2008 represents the last year for which finalized data regarding stem cell program grant making are available.