

THE CENTER FOR EXCELLENCE IN APOPTOSIS RESEARCH, THE PIONEER VALLEY LIFE SCIENCES INSTITUTE

CENTER HISTORY AND TECHNOLOGY FOCUS

The Pioneer Valley Life Sciences Institute (PVLSI) is a nonprofit organization established in 2002 to support bio-medical sciences research and related economic development activity in the Pioneer Valley and Springfield, a city that has struggled to build a viable economic base. PVLSI was funded in the context of a legislative set-aside that specified the location of a John Adams Innovation Institute-funded Center of Excellence (COE) in the southwestern part of the state. This COE would focus on biotechnology and medical devices.

As a joint program between the University of Massachusetts at Amherst and the Bay State Medical Center, PVLSI addresses the need for increasing life sciences funding at the University of Massachusetts (which is low compared with other research universities in the Commonwealth), and increasing research funding at the Bay State Health Center, the largest medical research institution in the region and the teaching hospital for Tufts University Medical School.

PVLSI seeks to enhance translational research that involves research teams of physical and medical scientists and engineers. The scientific goal is to solve interdisciplinary problems. The PVLSI offers an opportunity to fields that rarely collaborate to come together and add new dimensions to the understanding of health-related problems. The model stands in stark contrast to traditional medical science research practiced in medical schools where topical specializations lead to department-based reputations and the attraction of leading clinicians and medical researchers. PVLSI's goal from the onset has been to improve human health while supporting economic development in the region through business opportunities that arise from Institute research. Companies can contract with the Institute for services that include basic and applied research on the cellular and molecular levels, as well as teaming with research scientists, physicians, and engineers on investigations leading to the commercialization of products and processes. The range of fields that can be accessed is quite broad, spanning a large number of biomedical, physical science and engineering domains.

Building from this approach, PVLSI leadership sought to catalyze research programs. The first programmatic expertise developed was in breast cancer research. The Institute began the catalytic process by assembling teams of faculty and researchers and providing

Grantee: Pioneer Valley Life Science Initiative (Bay State Medical Center and UMass Amherst)

Project: The Center for Excellence in Apoptosis Research (CEAR)

JAI Grant Amount: \$14,347 for cluster development planning; \$2.78 million matching grant

Contract start date: 10/1/2006 for planning; 7/1/2007 for matching grant

Purpose: Establishment of the CEAR at the Pioneer Valley Life Sciences Institute, an independent research institute jointly owned by the University of Massachusetts, Amherst and the Bay State Health System.

small seed grants. Research teams graduated from seed grants, to larger grants, to institutional grants, to grants from larger foundations, all with the goal of building a research community.

From this intent emerged the original proposal to John Adams Innovation Institute (JAI). JAI encouraged the Institute to focus on a key area with considerable potential. PVLSI selected apoptosis, which is the process of programmed cell-death in body tissue to remove surplus or defective cells. Research in apoptosis is linked to understanding the treatment, prevention, and delay of diseases such as cancer, cardiovascular disease, and neurodegenerative disorders. This was an important area of faculty research at the University of Massachusetts at Amherst.

In 2005, JAI awarded the University of Massachusetts at Amherst a \$100,000 grant to strengthen its relationship with the Bay State Medical Center in Springfield and to involve more life sciences faculty in that relationship. An additional \$220,000 was awarded to support business development and center start-up. The original funds were expended on the development of a business plan, an associate director's salary, course development, and other start-up costs.

In 2006, JAI awarded the two institutions \$2.78 million to establish the Center of Excellence in Apoptosis Research (CEAR). For administrative purposes, the grant was directed through the University of Massachusetts. PVSLI leaders recognized that JAI was not in a position to make an investment on a scale typically required to support the research arm of a medical school. The goal then was to capitalize on existing infrastructure and research to build capacity that could lead to new firms and the creation of new jobs. In effect, the Center of Excellence in Apoptosis Research, CEAR, was created to address the issue of jobs in southwestern Massachusetts and the need for an interdisciplinary approach to the development of major new interventions in applied realms of medical science. Pursuing a center of excellence would facilitate collaboration between the two organizations.

CENTER PROFILE

CEAR has undertaken several activities that are designed to stimulate cross-domain research. These programs include the John Adams Biomedical Investigator awards, pilot grants, and interdisciplinary postdoctoral fellows grants, which promote the formation of initial collaborations that lead to research projects involving scientists, engineers, and clinicians with shared interests. CEAR recently introduced a fourth grant program — support for translational research. These grants will be larger than the pilot grants. The first will be awarded this year. These and other investigator-driven, discipline-spanning efforts inform development of research clusters and working groups. Over time, the Institute has hosted more novel and diverse groups of researchers. The newest includes a cluster in biopolymers that involves tissue engineering, gene therapy, investigations of DNA and RNA, and the development of anti-cancer treatments

In considering its structure, CEAR members attempted to benchmark the organization against similar entities around the country. In general, while they have found organizations with similar missions, their structures and funding sources differ. For example, wealthy donors supported some centers, and states, like Pennsylvania, have been more aggressive in providing funding for organizations similar to CEAR. An important next step for CEAR is the development of a business advisory committee, which may help the Center gain support from state and local entrepreneurs.

CEAR operates a state-of-the-art medical research facility. The Center is “fully equipped and staffed for animal care, histology, cell culture, and molecular biology. Two surgical suites for work with animal models to facilitate training, research, and medical instrument development are available. Shared equipment includes FACScan, confocal laser microscope, whole animal *in vivo* imaging system, real-time PCR, robotics devices for conventional histology and immunohistochemistry.”¹¹ However, the Center shares its location with the PVLSI and, as a result, CEAR’s physical space is limited by the PVLSI’s existing and planned building plans. New technologies are being acquired in conjunction with PVLSI-funded research projects. The shortage of space in the facility to support entrepreneurial ventures is compounded by the lack of suitable lease space in Springfield to support medical science ventures.

CEAR is led by four medical science-based administrators, and recently hired a manager for business development. The Center also has more than 65 faculty affiliates from the University of Massachusetts and the Bay State Medical Center. The chief administrator is executive director and a former medical doctor at Bay State Medical Center.

Business/Industry Participation

Since its inception, the CEAR leadership and faculty members have actively sought partnerships with companies. The chief administrators make efforts to connect with the local business community, and start-ups considering Massachusetts as a potential location contact them about becoming potential partners and obtaining laboratory space. Over the last four years, 20 such meetings have occurred.

The Center has a longstanding business relationship with Biomedical Research Models, a live animal research testing facility. The company is headquartered in Worcester, and the CEO lives in Springfield. The company has been an important element in PVLSI’s and CEAR’s planning and infrastructure.

For the last two years, the Center has been seeking resources to develop a small business incubator. The incubator is seen as a necessary part of CEAR’s business plan. However, restrictions on the use of CEAR funds are impeding construction of incubator space.

CEAR’s ability to build a strong relationship with industry has been slowed by the uneven business development expertise within the University of Massachusetts. While

¹¹ From PVLSI website, accessed May 5, 2010

the engineering programs have significant business development capacity, this same capacity is not as evident in other parts of the University. According to the leadership of both PVLSI and CEAR, intellectual property-related policies and processes at the University of Massachusetts are difficult to navigate. And, at the time of our interview, the presence of different programs at each of the University of Massachusetts system's campuses meant that CEAR had yet to receive approval for a policy governing its production and control of intellectual property. This issue remains a challenge. In response to some of these issues, the University of Massachusetts has restructured its business development program, and a new director has been appointed who is interested in enhancing the University's processes.

Center Outputs and Outcomes

CEAR has been an important element of the University's and the Medical Center's efforts to attract research and clinical personnel. Many of the new hires associated with the Center are Bay State Medical employees. CEAR affiliates are primarily professors at the University of Massachusetts at Amherst.

The Center's funding level continues to grow. Cumulative funds expended total approximately \$18 million. A review of the last two quarters indicates that CEAR expended about \$2 million per quarter. Funding sources are varied and include the National Institutes of Health, U.S. Department of Energy, American College of Sports Medicine, the National Science Foundation, and others. The research facility will undergo a significant infrastructure upgrade next year. CEAR recently received \$4.3 million in federal support from ARRA funds, including \$2.4 million in New Market Tax Credits.

The Center's research output continues to grow. Since its inception, Center affiliates have produced 59 academic articles, with additional research papers currently under review. CEAR has and continues to maintain the required level of research funding matches, as specified in the original program design. Contacts with several business associations have been developed, and companies are beginning to seek out the Center as a potential collaborator.

Table 1. Summary of Center Outputs

Output Measure	Fiscal Year 3
Research projects completed	This section is forthcoming.
Major new discoveries	Seahorse Bioscience and the Pioneer Valley Life Sciences Institute (PVLSI) agree to work together to validate a novel technology developed by Seahorse Bioscience to measure the CO ₂ (carbon dioxide) production rates of cells.
Research papers published	59
Invention disclosures & patents	N/A
Other activities/events	<ol style="list-style-type: none"> 1. The Breast Cancer Working Group (BCWG) continues to develop a mammary tissue bank, which may be the best in the country. It has served as a major tool in translational research for the community. 2. Several new collaborations have been established under the umbrella of the Biopolymer Working Group (BPWG), resulting in several new grant applications. 3. The Endocrine/Metabolism Working Group (EMWG) continues to focus on two related themes: endocrine-disrupting chemicals in the environment and obesity/diabetes. ARRA funds were awarded to Dr. Schneyer, EMWG head, to purchase capital equipment in support of EMWG activities. 4. Dr. Schwartz participated in an inter-institutional program to create the Institute for Drug Resistance (IDR) between UMass Amherst and the Mass. Medical School. The IDR has received \$150,000 from the President’s Science and Technology Fund and has recently submitted a major NIH grant, with several CEAR members as co investigators.
Private Research and Development Funding	<ul style="list-style-type: none"> • \$18 million in research expenditures. • “There are ongoing projects and collaborations with companies and new ones are developing focuses.”

Business development outcomes have been slow to materialize. There appear to be a number of causes for the slow progress:

- Business development capacity was limited at the outset and it has been a challenge to build it. Neither CEAR nor PVLSI had strong and visible reputations in the field of “medical science business development” and there was a lack of economic development capacity in both organizations.
- CEAR has faced staffing challenges in the area of business development. Until recently, CEAR was without a business development manager. The Center recently

hired an individual with medical and business experience to support new business ventures and foster community relationships.

- Despite the need for jobs in the region, there is a shortage of workers. In the most recent quarterly report, CEAR highlighted workplace opportunities in the medical sciences fields but there remains a disconnect between the skill needs of a high-tech operation like CEAR and the local labor force. Greater collaboration among all parties working in the area of job development is required to link underutilized labor assets with new jobs in medical sciences.

CONCLUSIONS

CEAR has made substantial progress toward its research goals. Research outputs are a testament to CEAR's progress. Business development outcomes have been slower to materialize. Despite some of the hurdles to date, the University recognizes a need to work with the city of Springfield on new firm formation and job development. CEAR and PVLSI are very important to this undertaking. The recent hiring of a business development professional to support new business ventures and foster community relationships is a critical step.

Beyond the research and economic development outcomes associated with PVLSI and CEAR, there appears to be an opportunity for these organizations to have a more systemic impact on the innovation ecosystem, in particular in the way that the University of Massachusetts interacts with affiliated applied research centers. To the extent that CEAR's relationships with the University surfaces and attempts to address issues of differing operating styles, reward structures, and practices regarding intellectual property, JAII's investment in CEAR has the potential to positively impact a variety of applied research efforts undertaken by the University of Massachusetts.