

TRANSLATIONAL TOOLBOX

Broadview Ventures

Investing in the Future of Cardiovascular Technology



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SUMMARY

Translational investigators and companies face a challenging economic environment when seeking funds to move pre-clinical stage research into human testing and beyond. Specifically, funding for cardiovascular research and product development is difficult to secure, whether from the NIH, venture capitalists, or industry. But new funding models for advancing patient-oriented science to the commercial sector are emerging. Boston-based Broadview Ventures, created by the Leducq Family Trust, promotes the development of technology for the diagnosis and treatment of cardiovascular disease and stroke through direct equity-based investments. It targets early stage companies seeking to fund proof-of-concept for technologies that hold promise as future breakthroughs for patient care. With 27 such investments over the last seven years, Broadview has considerable experience in the seed/early-stage space, and its investment model is demonstrating early signs of success. Broadview actively seeks collaborations with world-class translational investigators, inventors, and their companies, and welcomes scientific inquiries, discussion and proposals for funding. (J Am Coll Cardiol Basic Trans Sci 2016;1:87-93) © 2016 The Authors. Published by Elsevier on behalf of the American College of Cardiology Foundation. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

For translational investigators in cardiovascular disease and stroke, securing funds to move pre-clinical stage research into human testing and beyond remains a challenge. This “translational funding gap” is widening, and although many claim to fund early stage work, the data and experience of entrepreneurs in academia and elsewhere prove differently (Figure 1) (1). Despite recent increases in funding for translational research, the National Institutes of Health primarily supports basic discovery research, and has experienced significant budget pressure over the past years. Indeed, cardiovascular and stroke research continue to be relatively underfunded with respect to their impact on global health—as compared with cancer, for example (2,3)—and foundations and charitable organizations such as the American Heart Association can only make up some of this difference (Figure 2). In industry over the last decade, spending on research and

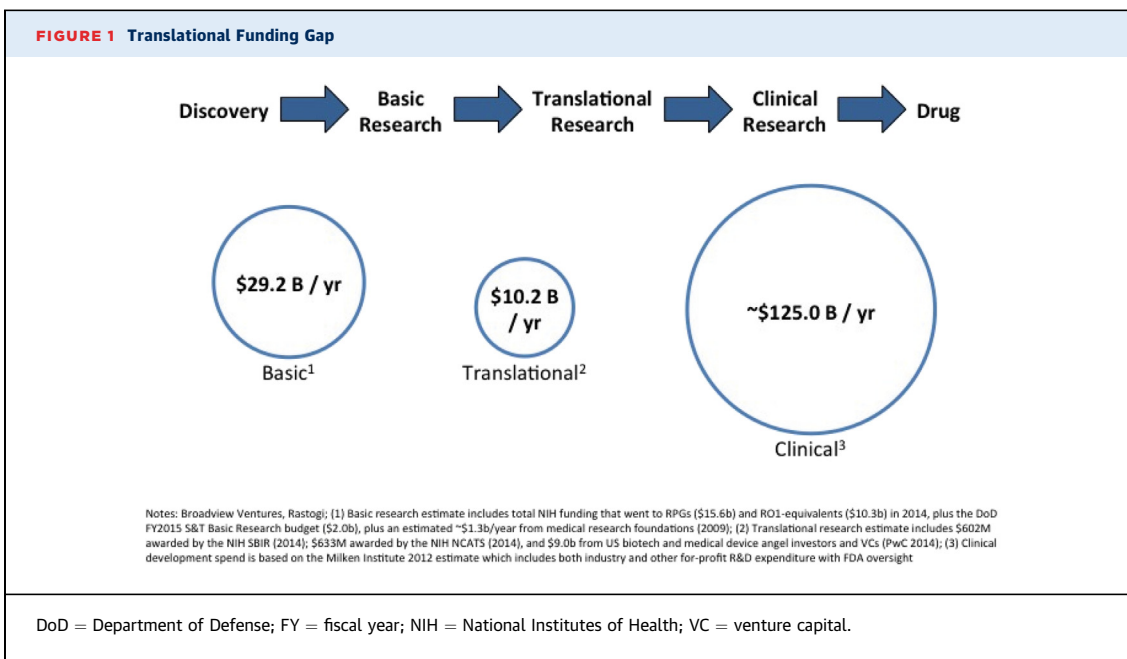
development has remained unchanged, whereas the cost to bring new drugs and devices to market is increasing, making access to industry funding by independent clinical investigators more difficult. And the percentage of venture capital funding directed toward start-up/seed investments is diminishing—with venture capital preferring to fund later-stage, lower-risk product development activities (Figure 3) (4).

The good news in this challenging picture is that new funding models for advancing patient-oriented science to the commercial sector are emerging. Family offices, foundations, incubators, angel groups, and others are stepping into new territory and directing funds toward the translational gap to help develop new therapies for patients (Figure 4) (5).

Boston-based Broadview Ventures is one such organization. Created by the Leducq Family Trust, Broadview Ventures was designed to promote the development of technology for the diagnosis and

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Manuscript received January 14, 2016; revised manuscript received January 21, 2016, accepted January 27, 2016.



treatment of cardiovascular disease and stroke through direct equity-based investments (cash in exchange for equity position). It targets early-stage companies seeking to fund proof of concept for technologies that hold promise as future breakthroughs for patient care. With 27 such investments over the last 7 years, Broadview has considerable experience in the seed/early-stage space, and its investment model is demonstrating early signs of success.

HISTORY: LEDUCQ FOUNDATION AND BROADVIEW VENTURES

The mission and structure of Broadview Ventures can be traced to the Leducq Foundation and its supporting trust, created in 1996 by French entrepreneur and industrialist Jean Leducq, together with his wife Sylviane. Motivated by a multigenerational family history of cardiovascular illness, and inspired to work

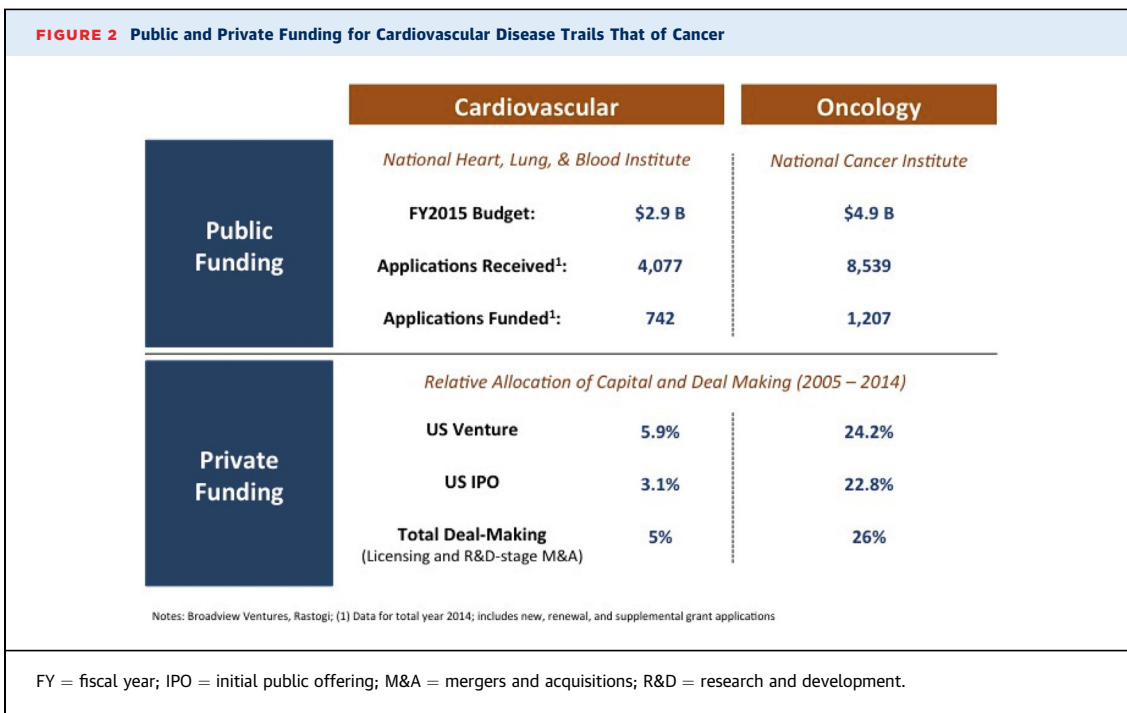
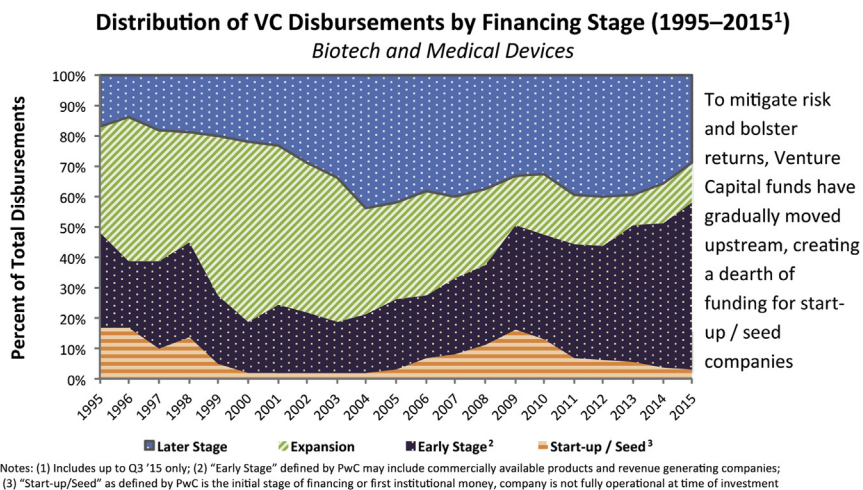


FIGURE 3 VC Dollars Exist, But Are Predominantly Focused on De-Risked, Late-Stage Programs



VC = venture capital.

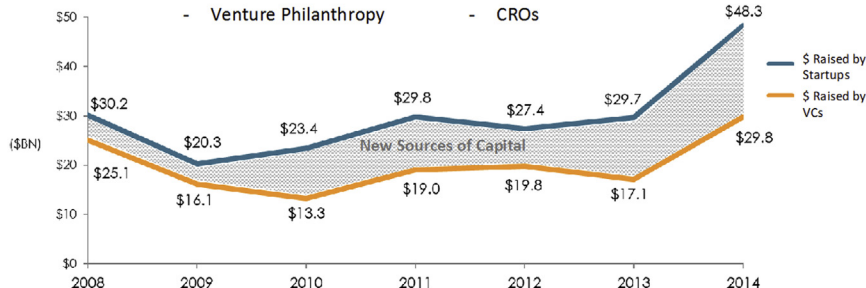
at the international level through years of living and working abroad, the Leducqs used the proceeds of the sale of the family’s multinational linen and uniform services businesses to establish a foundation for cardiovascular research with a mission to improve human health through international efforts to combat cardiovascular and neurovascular disease. The foundation’s signature program, the Transatlantic Networks of Excellence in Cardiovascular and Neurovascular Disease, supports international networks of experts in cardiovascular disease and stroke that work collaboratively to advance scientific

knowledge, bring new technology to patient care, and help to train early career investigators. Since making its first award in 1999, the foundation has committed over \$350 million to cardiovascular and neurovascular research, supporting 47 research networks at 130 institutions in 19 countries.

From the outset, the Leducq organization was interested in promoting the technology that was developed through the research it supported. The board of the Leducq Family Trust soon determined that the best way to accomplish this objective was to create an independent organization dedicated solely

FIGURE 4 Start-Ups Are Turning to New Sources of Funding to Fill the Gap

- More capital is deployed into start-ups each year than is raised by VCs
- Additional capital is coming from new sources such as:
 - Incubators
 - Super Angels
 - Crowd Funding
 - Venture Philanthropy
 - Investment Banks
 - Family Offices
 - International Funds
 - CROs



CRO = contract research organization; VC = venture capital.

to promoting and investing in technology. In 2008, it decided to create Broadview Ventures, specifically addressing the translational gap by providing seed and early-stage funding for companies on the path to developing commercial products for patients with cardiovascular and neurovascular disease. Broadview shares a mission in cardiovascular and neurovascular disease with the Leducq Foundation, but proceeds through a direct investment model, whereas the foundation works through a more traditional grant program.

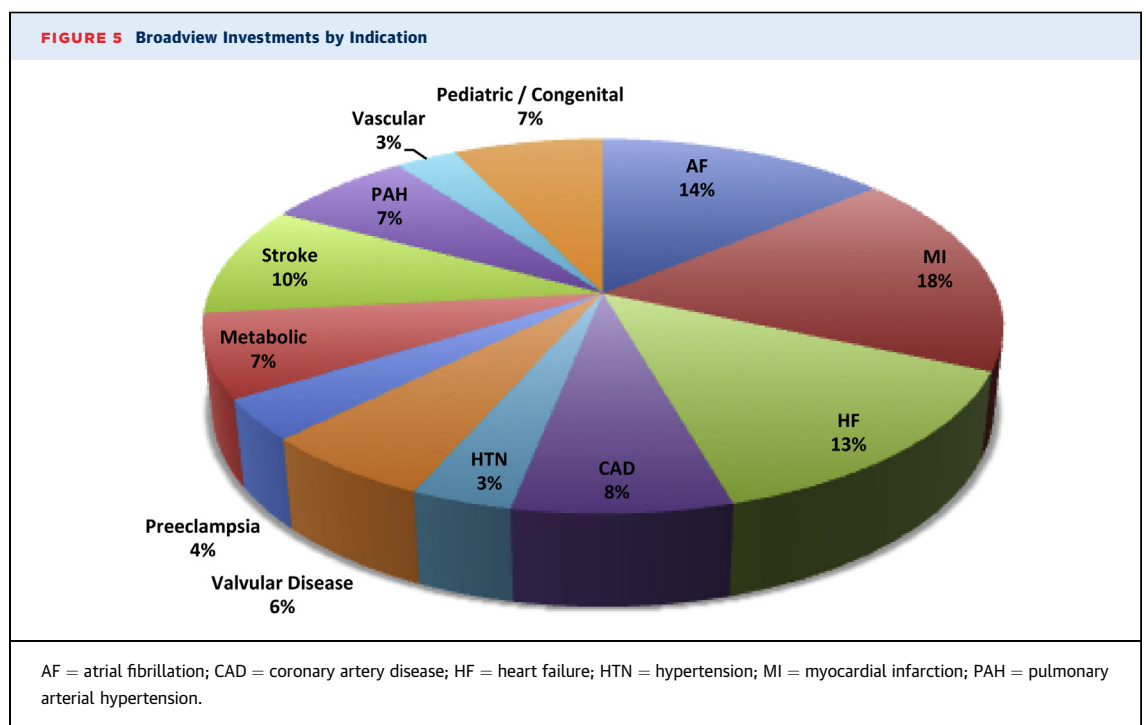
Broadview is purposefully structured as a for-profit venture capital firm so that it can interact on equal ground with like-minded venture capitalists and corporate partners that have financial return on investment as a primary goal. That said, Broadview is mission-, not profit-driven, and defines success through social impact and improving patient care. Its mission orientation allows Broadview to invest in important areas that others may see as less interesting due to market size or risk issues (e.g., pediatrics). The sole shareholder of Broadview is the Leducq Family Trust, which can manage both the risk and long-term capital commitments associated with early-stage investing. Broadview is structured as an evergreen fund and all generated profits are used for additional early stage investments or to support activities of the Leducq Foundation.

BROADVIEW ACTIVITY

In sourcing investments, Broadview defines cardiovascular disease broadly. In addition to investing in the core therapeutic areas within cardiovascular disease such as myocardial infarction, heart failure, arrhythmias, and valvular disease, Broadview is also interested in underlying pathways such as inflammation and atherogenesis; predisposing factors such as hypertension; and comorbidities such as cardiorenal and cardiopulmonary conditions. Type 2 diabetes, obesity, and dyslipidemia, as cardiovascular risk factors, are also considered to fall within the scope of the mission. Stroke is the primary indication within Broadview's neurovascular focus.

The investments made thus far by Broadview include microRNA, stem cell, and gene therapies; nonsurgical and minimally invasive delivery techniques for valves and devices; and mechanical and pharmacological treatments for atrial fibrillation, hypertension, stroke, diabetes, and obesity (Figure 5). Broadview invests in all technology platforms related to its mission—diagnostics, therapeutics, and devices (Figure 6). Five of its investments have been made to support technology developed by grantees of the Leducq Foundation.

Broadview receives approximately 300 proposals annually and invests \$1 million in 4 to 5 of these opportunities each year. Broadview seeks high-



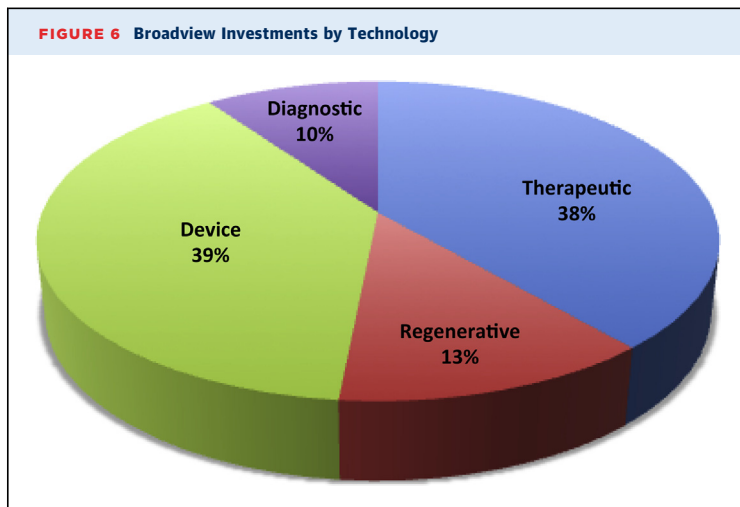
impact science that has the potential to change the practice of cardiology. To be considered for investment, the technology must have adequate intellectual property protection and a clear ability to influence patient therapy and/or standard of care. The proposed use of funds must be well defined with quantifiable and achievable milestones. And there must be a clear understanding of future funding requirements to bring the technology through clinical development to market.

Broadview is fortunate to be guided by a world-class strategic advisory board composed of thought leaders from academia, finance, and industry (Figure 7). It also has access to a network of cardiovascular and neurovascular medicine experts developed over the years via the Leducq Foundation. Broadview utilizes these relationships for deal sourcing, diligence, investment counsel, clinical development advice, and portfolio company guidance. Without a doubt, these thought leaders have played a critical role in the development and advancement of the Broadview Ventures investment model.

The Boston-based Broadview investment team, led by Christopher Colecchi, consists of physicians, scientists, and business professionals who oversee deal sourcing, diligence, and the investment process. After investment, the Broadview team plays an active role via board participation, offering long-term support throughout the life of its portfolio companies.

CASE STUDY

Although improving patient care is its main goal, Broadview also hopes to share its learning and experiences with other family offices and venture



philanthropic investors. Although still evolving as a fund, Broadview has seen some early signs of success, most notably the recent acquisition by Edwards Lifesciences of CardiAQ Valve Technologies, a company funded by Broadview that is focused on developing a percutaneous mitral valve technology.

The CardiAQ story demonstrates the many steps, layers of funding and expertise, and persistence necessary for successful early stage investing. In 2008, Broadview was connected with a surgeon and business executive both working in their spare hours to develop a percutaneous mitral valve implantation device. Later that year, after a significant level of diligence and review by its strategic advisory board, Broadview made a \$750,000 seed investment in CardiAQ to develop a device prototype and conduct early animal testing. This investment attracted additional corporate and board leadership

FIGURE 7 2016 Broadview Strategic Advisory Board

Eugene Braunwald – Distinguished Hersey Professor of Medicine at Harvard Medical School, and Chairman of the TIMI Study Group at the Brigham and Women’s Hospital.

Kim Fox – Consultant Cardiologist and Director of Cardiology at the Royal Brompton Hospital, and Professor of Clinical Cardiology, Imperial College.

Thomas Hughes – President and CEO of Zafgen, Inc. and Director on the Board of miRagen Therapeutics, Inc. and member of several SABs, including Nimbus Discovery, LLC.

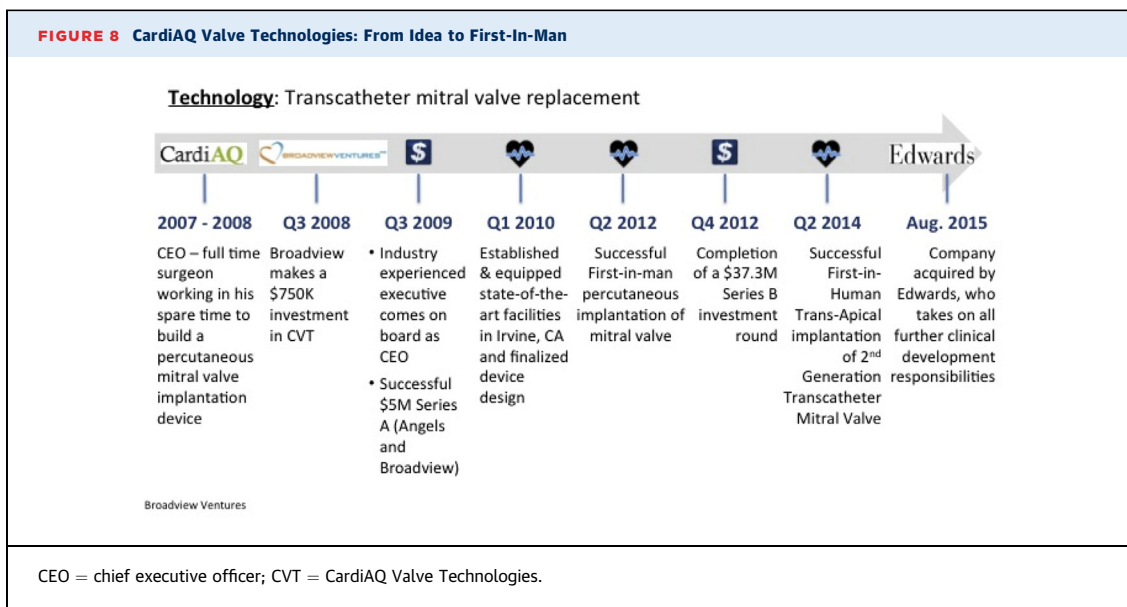
Jerry Karabelas – Partner at Care Capital and chairman of the board of several companies. Founder of Novartis BioVenture fund and former CEO of Novartis Pharma.

Martin Landaluce – President, Board of Directors of the Leducq Foundation

Joseph Loscalzo – Hersey Professor of the Theory and Practice of Medicine at Harvard Medical School, and Chairman of the Department of Medicine and Physician-in-Chief at the Brigham and Women’s Hospital, and Vice Director of the Brigham Biomedical Research Institute.

Eric Rose – Academic physician and entrepreneur, former Surgeon-in-Chief at the New York Presbyterian Hospital/Columbia, and Chairman of the Dept. of Surgery at Columbia University, currently the Executive Vice President for Life Sciences at MacAndrews & Forbes, and CEO of Siga Technologies, Inc.

David Tancredi – Executive Director, Leducq Foundation, and President, Broadview Ventures



from within the valve industry and led to a \$5M Series A financing round in 2011 in which Broadview also participated. The company established state-of-the-art facilities in Irvine, California, and successfully completed the first-ever transcatheter mitral valve replacement in a porcine model. In 2012, the company conducted successful first-in-human implantation of the valve in Europe. This milestone attracted a large Series B financing round with participation by several large, well-known, venture capital investors (OrbiMed, InVus, Versant, and Advent). With this funding, a second-generation device was developed and successfully implanted in several more patients. In August of 2015, Edwards Lifesciences acquired CardiAQ Valve Technologies for \$400 million (Figure 8).

Although the financial return on investment was positive for all involved, most important to Broadview is that the technology, through Edwards' market

leadership and extensive resources, will now move to large-scale clinical trials for regulatory approval—and hopefully become a commercial product that will improve the lives of patients with mitral valve disease. In addition, the investment story demonstrates that mission-related, philanthropic-based funds can be deployed at an early stage to help science cross the translational gap to move through the clinical development pathway.

For every dollar invested by Broadview, its portfolio companies have raised seven additional dollars in co-investments, follow-on funding, and grants. This additional funding has enabled smaller “surrogate markers of success” that demonstrate day-to-day progress at Broadview's portfolio companies—such as movement from pre-clinical work to first-in-human trials, achievement of regulatory approval for products, and a successful European product launch. In addition, many of Broadview portfolio companies have developed relationships with strategic investors and industry partners to support movement toward commercial product approval.

FIGURE 9 Broadview Ventures Contact Information

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THE FUTURE

The leadership, vision, and resources of the Leducq Family Trust have been critical to the ability of Broadview to look past the near term for high-risk-high-reward, longer-term solutions to today's pressing problems in cardiovascular and neurovascular disease. With early-stage investing in the life sciences comes acceptance that the road for the fund and its portfolio companies will be challenging. There will

be many failures to get to far fewer successes. Importantly, however, this work remains consistent with the vision and values of the founders, whose bequest will ensure that the foundation and Broadview remain true to their mission in cardiovascular and neurovascular science and will have the resources to continue the good work that started with the Leducq Foundation 20 years ago.

Broadview actively seeks collaborations with world-class translational investigators, inventors, and

their companies, and welcomes scientific inquiries, discussion and proposals for funding (Figure 9). Investigators seeking funding should send an executive summary of their proposal to Broadview at the e-mail address provided (Figure 9).

REPRINT REQUESTS AND CORRESPONDENCE: Mr. Christopher Colecchi, Broadview Ventures, Inc., 125 High Street, 9th Floor, Boston, Massachusetts 02110. E-mail: ccolecchi@broadviewventures.org.

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KEY WORDS cardiovascular, philanthropy, venture capital