

Cardiovascular and Regenerative Medicine



The Cleveland Clinic
Cleveland, Ohio

Mending Broken Hearts

Heart disease is the single greatest cause of death among Americans. Each year, an estimated 1.2 million Americans have a new or recurrent coronary attack or succumb to fatal coronary heart disease. In addition to the tremendous personal cost, coronary heart disease is an enormous economic burden on the U.S. healthcare system, with an estimated direct and indirect cost of \$151.6 billion in 2007. The Ohio Third Frontier, building on world-class technology and expertise in Ohio, has invested in several complementary and collaborative approaches to help solve this tremendous healthcare problem.

The **Cleveland Clinic** is recognized as a world leader in cardiovascular medicine, consistently chosen as the top-ranked program by *US News & World Report*. Leveraging this expertise, the Ohio Third Frontier has partnered with the **Cleveland Clinic** to support, create and attract new cardiovascular focused companies through investments in the **Atrial Fibrillation Innovation Center** and the **Global Cardiovascular Innovation Center**. The two Centers have recently merged, combining assets and strengths to represent an international powerhouse of research, clinical medicine, and commercialization related to cardiovascular therapies. Together they are the Ohio Third Frontier's largest single investment to date.

The **Cleveland Clinic's** combined effort, now represented as the **Global Cardiovascular Innovation Center**, is supporting innovative cardiovascular-focused companies through research investments, collaborations with clinical scientists, and incubation support. Backed by the reputation and expertise of the **Cleveland Clinic**, the **Global Cardiovascular Innovation Center** has been successful in creating,

investing in and attracting 35 companies. These new Ohio companies' technologies include medical devices, cell-based therapies, and imaging technology that contribute to cardiovascular health. Further, the **Global Cardiovascular Innovation Center**, in collaboration with an urban development group dedicated to upgrading the Fairfax neighborhood of Cleveland, has recently broken ground on a new 50,000 square-foot incubator facility near the **Cleveland Clinic** to further expand and support companies created and attracted.

The Cleveland Clinic – Cleveland, Ohio



A complementary approach to cardiovascular healthcare is being pursued just down the street by the **Center for Stem Cell and Regenerative Medicine** established in 2003 at **Case Western Reserve University** through an investment by the Ohio Third Frontier. The **Center for Stem Cell and Regenerative Medicine's** mission is to restore health through the use of stem cells and regenerative medicine. Cardiovascular disease is one of the Center for Stem Cell and Regenerative Medicine's successful focus areas. The Center has

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spun out two companies to date – **Arteriocyte Medical Systems** and **AcelleRX Therapeutics** – along with other industrial partnerships, including **Athersys**. These companies are focused on the potential of stem cells to restore function to tissue damaged by a heart attack. Therapies that have been developed through the **Center for Stem Cell and Regenerative Medicine** and its associated companies have moved into clinical trials in humans, a significant step along the pathway to U.S. Food and Drug Administration (FDA) acceptance of a new treatment.



Athersys, Inc. – Cleveland, Ohio

The awards in cardiovascular and regenerative medicine complement each other by supporting a broad-based set of technologies to address the problem of heart disease. Their collaborative efforts have resulted in joint research, development, and commercialization projects at numerous Ohio research institutions and biomedical companies that are capturing the attention of venture capital funds to continue the technical advances needed to commercialize cardiovascular products and services. As a result, a true cluster of economic activity focused on curing heart disease has been anchored in Ohio.

Commercialization Summaries:

Arteriocyte Medical Systems, Inc. is a clinical stage biotechnology company that engineers stem cell and tissue-based therapies with the goal of developing commercially available stem cell therapies. Although patients with chronic coronary heart disease are offered a number of treatment choices, a significant portion of the affected patient population is unable to withstand surgical intervention. Often referred to as “no-option” cases, these patients are the initial targets for **Arteriocyte’s** cell therapy product – an infusion of cultured stem cells into the heart to stimulate blood flow.

AcelleRX Therapeutics, Inc. is in the development stages of regenerative medicine technologies for treatment of cardiovascular disease. Discovered by **Cleveland Clinic** cardiologist Marc Penn, the company’s product, Stromal Derived Factor – 1, significantly increases cardiac function through promoting cell survival and revascularization after a heart attack, significantly enhancing the efficacy of a broad range of clinical trial stage cell therapies.

Athersys, Inc.’s proprietary MultiStem® system is a biologic product that consists of stem cells used in the treatment of acute heart attacks, potentially eliminating the need for immunosuppressive drugs to damaged cardiac tissue. Obtained from adult bone marrow or other non-embryonic tissue sources, the cells may be produced on a large scale for future clinical use and stored in frozen form until needed.