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# Celladon Corporation and Momentum Research Complete Enrollment of MYDICAR® Phase 2 Study of First-in-Human Gene Transfer to Treat Patients with Advanced Heart Failure

## *Phase 1/2 CUPID Data Highlight Biological Effects of SERCA2a Enzyme Replacement and Demonstrate Safety*

SAN DIEGO--(BUSINESS WIRE)-- Celladon Corporation and Momentum Research, Inc. today announced completion of enrollment of the phase 2 double-blind portion of the Calcium Up-regulation by Percutaneous Administration of Gene Therapy in Cardiac Disease (CUPID) trial. Momentum Research is Celladon's consulting and management organization with clinical expertise in the development of cardiovascular products and trials.

"Strong interest in MYDICAR® from investigators and patients emphasizes the substantial unmet medical need in these very sick patients with few other viable options. Patients will be observed for 6 months, and we expect Interim data results to be available mid-2010," said Krisztina M. Zsebo, Ph.D., president and chief executive officer. "We remain encouraged by the meaningful improvements in cardiac function and overall condition of patients; findings that we believe demonstrate the return toward normal intracellular calcium cycling and contractility in some of the heart muscle cells."

"The CUPID trial is designed to rescue a failing heart by replacing an enzyme known to play a critical role in healthy cardiac function," said Mariell Jessup, M.D., Lead Investigator, who works at the University of Pennsylvania. "The objective of the study is not only to improve the symptoms of heart failure but to reverse the severity of the disease in individual patients. The extraordinary team of clinical investigators, Celladon and Momentum Research have made this challenging concept a reality."

The randomized, double-blind, placebo-controlled study is designed to examine the effect of MYDICAR® (AAV1/SERCA2a) in the treatment of severe heart failure. MYDICAR® is an enzyme-replacement therapy intended to restore levels of SERCA2a, a protein that is vital in the proper functioning of the heart. The CUPID trial enrolled 37 patients with severe forms of ischemic and dilated cardiomyopathies who had New York Heart Association Class III or IV heart failure, significantly impaired pumping function of their hearts, and less than half the normal ability to transport and utilize oxygen during cardiopulmonary exercise testing. Patients were treated with 1 of 3 doses of MYDICAR® or placebo via a single intracoronary infusion and will be followed for 12 months. Effects of treatment will be assessed by changes in how the heart contracts, a blood test of an important marker of heart failure called NT-proBNP, symptoms of heart failure and ability to exercise.

Zsebo adds, "In addition, we have adequate MYDICAR® product manufactured to complete phase 3 and recently acquired an exclusive license to utilize Adeno-Associated Viral (AAV) vector technology in heart failure. This, combined with our extensive preclinical and clinical investigation of gene-based therapy for heart failure, bodes well for commercial product development of MYDICAR® and is important to potential strategic partners."

**CUPID Phase 1 Clinical Trials**

The phase 1 open-label, sequential dose escalation, multi-center phase of the trial was designed to investigate safety and biological effects of restoring SERCA2a enzyme activity in heart muscle cells. The enzyme levels are decreased in late stages of heart failure, and extensive research shows loss of SERCA2a levels represents a common pathway resulting in a defect in the ability of the heart to contract properly. Replacing the enzyme may restore function and reverse heart failure.

Safety of MYDICAR® was demonstrated in an earlier phase 1 study.

The phase 1 dose-escalation data demonstrated that MYDICAR® had an acceptable safety profile in 12 patients and 4 increasing doses. Safety was determined by study investigators and an independent safety monitoring committee. In addition, improvements from baseline to 6 months were observed across a number of key efficacy parameters important in assessing heart failure status. Efficacy was defined as the mean improvement in at least 2 of 5 endpoints without any worsening in the remaining endpoints, including a functional six-minute walk test, oxygen consumption, quality of life questionnaire, biomarker activity and left ventricular size and function.

**Small Molecule Development of SERCA2a**

Celladon is also developing specific small molecule allosteric modulators of the SERCA2a enzyme for both acute and chronic heart failure, and has completed pharmacology and toxicology studies demonstrating efficacy and safety.

**About Heart Failure**

Chronic heart failure is an increasingly important health problem. It is the leading medical cause of hospitalization and is expected to result in an estimated direct and indirect cost to the healthcare system in 2009 of $37.2 billion. About 5 million people in the United States have heart failure, and another 550,000 new cases are diagnosed each year. Heart failure contributes to or causes about 280,000 deaths annually. The most common symptoms of heart failure are shortness of breath, feeling tired, and swelling in the ankles, feet, legs, and sometimes the abdomen. There is no cure for heart failure.

**About Momentum Research, Inc.**

Momentum Research, Inc. (MRI) is a boutique consulting and management organization that partners with its clients in the development and organization of clinical trials for cardiovascular indications. With operations beginning in 2007, MRI leverages the resources of Clinical Research Organizations and other service providers to efficiently manage and direct clinical research projects of all sizes for both drug candidates and medical devices. MRI works with its clients to deliver quality results in a timely and cost efficient manner. MRI aims to aid in the development new therapies which will improve the practice of cardiovascular medicine. To learn more about MRI, visit www.momentum-research.com.

**About Celladon Corporation**

Celladon Corporation, based in La Jolla, California, was launched in October 2004 as a privately held biotechnology company founded with the goal of becoming the leader in developing molecular therapies for the treatment of heart failure. The company's products target the key enzyme deficiency in advanced heart failure, SERCA2a, which regulates calcium cycling and contractility in heart muscle cells. Celladon's first product candidate, MYDICAR®, delivers the gene for the SERCA2a enzyme. MYDICAR® is currently being tested in Phase 1 and 2 clinical trials. Celladon is also developing traditional small molecule activators of SERCA2a for the treatment of heart failure. To learn more about Celladon, visit Celladon's website at www.celladon.net.

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