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miRagen Therapeutics Announces the Publication of Compelling Data Suggesting the MIRC-9103 Program May Have Utility in Treating Multiple Disorders Associated with Metabolic Syndrome

- Research reveals the heart's role in controlling systemic energy balance and suggests miRagen's lead program may have broad cardiometabolic benefit
- Study results published today in the prestigious scientific journal *Cell*

BOULDER, CO, April 26, 2012 – MiRagen Therapeutics, Inc., a biopharmaceutical company developing innovative microRNA (miRNA)-based therapeutics primarily for the treatment of patients who suffer from cardiovascular and muscle disease, announced today that scientific results published in the journal *Cell* reveal the central role of the heart in whole-body metabolism. The data suggests that miRagen's lead program, MIRC-9103 (antimiR-208), in addition to providing benefit in the setting of cardiac dysfunction, may have therapeutic utility in a variety of metabolic disorders that contribute to Metabolic Syndrome. Metabolic Syndrome is a cluster of conditions — increased blood pressure, a high blood sugar level, excess body fat around the waist, and abnormal blood lipid and cholesterol levels — that occur together, increasing the risk of heart disease, stroke, and diabetes. The MIRC-9103 program is one subject of the cardiovascular drug development alliance between miRagen Therapeutics and Servier. The research was conducted by miRagen scientists in collaboration with researchers at The University of Texas Southwestern Medical Center.

"These findings build on what we already know about the important role for the cardiac specific microRNA-208 in heart disease," said Eric N. Olson, Ph.D., Chief Scientific Advisor and Co-Founder of miRagen Therapeutics, Inc. Dr. Olson is the study's senior author and Chairman of Molecular Biology at UT Southwestern. "The fact that pharmacological treatment with antimiR-208 in a model of diabetes and obesity shows profound beneficial effects in regulating systemic energy homeostasis changes the way we view the role of the heart in metabolism. The implications for therapeutic intervention in these areas are significant."

In addition to revealing whole-body metabolism regulation by the heart, the data has significant implications for the potential of miRagen's lead compound to treat a variety of cardiometabolic disorders. More specifically, the paper clearly indicates that modulating the miR-208 gene control pathway enhances metabolic rate, improves insulin sensitivity and glucose handling, lowers blood triglyceride and cholesterol levels, reduces fat deposition in adipose and liver, and confers resistance to obesity. These attributes suggest a potentially central role for miR-208 directed therapies in treating the conditions that contribute to Metabolic Syndrome.

"Metabolic Syndrome is unfortunately becoming increasingly common in the United States and the developing world," said William S. Marshall, Ph.D., President and Chief Executive Officer. "We have previously published compelling results in model systems demonstrating the beneficial effects of antimiR-208 dosing in prevention of heart failure. The results reported today show that we may also be able to address



many metabolic conditions that contribute to the development of cardiovascular disease. We are hopeful that these unprecedented results can further our goal of bringing life-changing medicines to patients in need.”

About microRNAs: MicroRNAs have emerged as an important class of small RNAs encoded in the genome. They act to control the expression of sets of genes and entire pathways and are thus thought of as master regulators of gene expression. Recent studies have demonstrated that microRNAs are associated with many disease processes. Because they are single molecular entities that dictate the expression of fundamental regulatory pathways, microRNAs represent potential drug targets for controlling many biologic and disease processes.

About miRagen Therapeutics: MiRagen Therapeutics, Inc., is a biopharmaceutical company founded to harness the power of microRNA (miRNA) biology and develop innovative microRNA-based therapeutics for cardiovascular and muscle disease. In October 2011, miRagen and Les Laboratoires Servier, a leading European pharmaceutical company, entered into a strategic alliance for the research and development of microRNA-based therapeutics for the treatment of patients afflicted with cardiovascular disease. Combining in-house expertise in microRNA biology and chemistry with strong external partnerships and academic collaborations, miRagen is striving to make a difference in health care across the globe. For more information, please visit www.miragenrx.com.

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