



Aptamers May Hold Clue to Treating Heart Failure

As the heart progresses toward heart failure, it produces high levels of a protein called Osteopontin, which is known to activate pathological remodeling of the heart. Lina Shehadeh, Ph.D., assistant professor of medicine in the Cardiovascular Division and the Interdisciplinary Stem Cell Institute, and a team of investigators decided to see if they could find a way to block Osteopontin signaling to prevent – or possibly even reverse – heart failure.

Working with a pharmacological molecule called an RNA aptamer, Shehadeh injected mice modeled for heart failure. Follow-up examinations revealed that the aptamer both prevented and reversed heart failure in the mice. The findings were significant because although aptamers have been used in cancer studies for many years, this study was the first exploring their potential role in treating heart failure. An article describing the research was [published](#) in the February issue of the *Journal of Cardiovascular Research*, with Shehadeh as senior author.

“Further investigation is needed, as many therapeutic studies that work in mice fail in humans,” said Shehadeh who is also director of the Cardiovascular Module for M.D. and M.D./M.P.H. programs. “This is partly because it is much easier to reverse a disease in mouse. Therefore, to increase the chances that the aptamer would benefit humans, our next step will be to attempt combinatorial therapy – we will treat mice with the Osteopontin aptamer conjugated with other therapeutic



oligonucleotides. Since the aptamer is made of nucleic acids, it is rather simple to conjugate it with other nucleic acids (such as anti-miRs, mRNA, or siRNAs) that have been shown to be beneficial in the treatment of heart failure.”

“It is inspiring to see how Lina has applied aptamer therapeutics to cardiovascular disease,” said Eli Gilboa, Ph.D., Dodson Professor of Microbiology and Immunology, and Director of the Dodson Interdisciplinary Immunotherapy Institute at the University of Miami Miller School of Medicine. Gilboa is a pioneer in the field of aptamer-siRNA therapy in cancer.

The team members who performed this research are Jihe Li, Ph.D., a former postdoctoral associate in the lab, Kevyan Yousefi, Pharm.D., and Wen Ding, B.S., both Ph.D. students in the lab, and Jayanti Singh, Ph.D., a former research associate in the lab.

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