Growth factor essential to epicardial cell function: research

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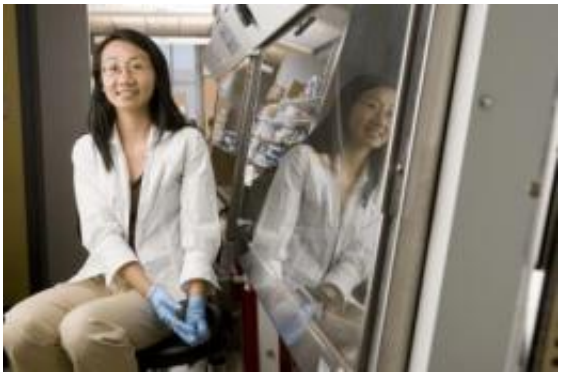

This is Ching-Ling (Ellen) Lien, Ph.D., of the Saban Research Institute at Childrens Hospital Los Angeles. Credit: Photo courtesy of Childrens Hospital Los Angeles

In research that one day may lead to the discovery of how to regenerate tissue damaged by heart disease, investigators at Childrens Hospital Los Angeles have identified PDGF as a key factor in the proliferation and transformation of epicardial cells, one type of cell that surrounds heart muscle and contributes to vessels.

The study was published online September 21 in advance of the publication of the Proceedings of the National Academy of Sciences of the United States of America. Ching-Ling (Ellen) Lien, PhD, led a team of researchers at the Developmental Biology and Regenerative Medicine Program and Heart Institute that included Jieun Kim, PhD, Qiong Wu,

MS, Yolanda Zhang, MD, Katie M. Wiens, PhD, Ying Huang, MS, Nicole Rubin, BS. The research was supported by Vaughn A. Starnes, MD director of the Childrens Hospital Los Angeles Heart Institute, and joined by Hiroyuki Shimada, MD, Tai-lan Tuan, PhD, of The Saban Research Institute of Childrens Hospital.

The team demonstrated that PDGF 'signaling' is required for epicardial cell proliferation, as well as supportive cell and coronary blood vessel formation leading to regeneration of cardiac tissue in zebrafish.

Although adult human hearts cannot generate new cardiac muscle, the tiny, freshwater zebrafish is capable of fully regenerating its heart after injury or amputation. Because of this unique ability to regenerate, the zebrafish has become a model for studying ways of possibly 'turning on' the repair process in the human heart.

In zebrafish, newly formed coronary vessels supply blood to the regenerating heart. The development of coronary blood vessels during zebrafish heart regeneration has been postulated to occur in the same way as the heart and vessels were originally formed in the embryo. Dr. Lien, an assistant professor of surgery at the Keck School of Medicine at the University of Southern California, and her team found biochemical markers consistent with embryonic development in the regenerated zebrafish hearts.

The team also found that when PDGF signaling was blocked, epicardial cell proliferation, expression of the embryonic biochemical markers, and coronary blood vessel development were impaired.

"By understanding the mechanism involved in developing a new blood supply to injured cardiac tissue, we can begin to develop a therapeutic strategy for the treatment of heart disease in humans," noted Dr. David Warburton, director of Developmental Biology and Regenerative

Medicine at The Saban Research Institute.

Provided by Children's Hospital Los Angeles