

New strategies to improve treatment and ultimately prevent heart failure in children

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Structural cardiovascular abnormalities present at birth are the leading cause of heart failure in children. Nearly half a million children in the United States have structural heart problems ranging in severity from relatively simple issues, such as small holes between chambers of the heart, to very severe malformations, including complete absence of one or more chambers or valves.

The July issue of the journal *Pediatric Cardiology* focuses on a recent meeting of pediatric cardiology experts from around the world who gathered at the Indiana University School of Medicine and Riley Hospital for Children for the inaugural Riley Heart Center Symposium on Cardiac Development. The experts presented new basic science and clinical research to improve treatment of, and ultimately to prevent, the congenital defects and damage acquired after birth that cause [heart failure](#) in children.

The symposium focused on the growth of the ventricular wall in development and disease, and on the diagnosis and treatment of non-compaction of the [left ventricle](#) - an abnormality of the major pumping chamber of the heart which often leads to heart failure. Both are areas of ongoing study by the Riley Heart Research Center.

"A wide spectrum of congenital and acquired cardiac injuries can give rise to childhood heart failure. To advance our ability to treat heart failure in children, it is of critical importance to develop an understanding of the cellular and molecular mechanisms underlying the

genesis of [congenital heart defects](#), and to develop an understanding of the molecular processes that negatively impact upon heart muscle cell function and survival during the progression of childhood heart failure," wrote symposium organizer Loren Field, Ph.D., professor of medicine, and pediatrics, who directs the Riley Heart Research Center and convened the symposium. The Riley Heart Research Center is located in the Herman B Wells Center for Pediatric Research in the Department of Pediatrics at the IU School of Medicine and Riley Hospital.

Although there are fewer children than adults with this serious and sometimes fatal condition, the societal issues and health-care costs of heart failure, are more significant in young patients given the longer lifespan of children.

Growth of the heart during development is characterized by the differentiation and proliferation of beating cardiac muscle cells. After birth there is a transition which limits the ability of the heart to regenerate itself following injury or disease. In his presentation and paper, Dr. Field described the innovative cell cycle-based strategies he employs in the laboratory to stimulate heart muscle tissue to repair itself resulting in regeneration of damaged tissue.

Designing and testing genetically engineered mice, Weinian Shou, Ph.D., associate professor of pediatrics, reported that he and colleagues are gaining a greater understanding of the molecular and genetic mechanisms of noncompaction of the left ventricle, with the ultimate goal of finding potential new therapies.

In a study designed to evaluate the outcomes of children with noncompaction of the left ventricle, Eric Ebenroth, M.D., associate clinical professor of pediatrics, followed 46 Riley Hospital patients with this type of heart failure. He found that when the disease presents before the child reaches his first birthday, the child has a much lower chance

for survival. Dr. Ebenroth and colleagues now are working to identify additional risk factors associated with the increased likelihood of death in these patients in the hopes of improving their outcomes.

"It is hoped that these proceedings, as well as those from future Riley Heart Center Symposia, will foster collaborative projects between clinical and basic researchers who are dedicated to improving the treatment, and ultimately preventing the onset, of heart failure in the young," said Dr. Field.

Source: Indiana University ([news](#) : [web](#))

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