IBT researchers learn more about heart

(HOUSTON) — Researchers at the Texas A&M Health Science Center (TAMHSC) Institute of Biosciences and Technology at Houston have learned that mammalian heart size is controlled by genetic programs during prenatal development along with a special mechanism, a finding that could potentially help in regenerating the heart and other parts of the body following injury.

The study of the Hippo pathway – an anti-growth network of genes – is available online and in the current issue of the journal Science.

“We speculated the Hippo pathway negatively regulates heart size by controlling the number of heart cells initially produced at the onset of heart development,” said James Martin, M.D., Ph.D., professor and interim director of the Center for Molecular Disease and Development (CMDD) in the TAMHSC-Institute of Biosciences and Technology and study senior author. “Our findings reveal the Hippo pathway indeed restricts heart size, though at a later developmental stage, to control proliferation of heart muscle cells.”

In the study, Dr. Martin and his colleagues systematically deleted Hippo pathway genes from the mice heart, monitoring for size changes in heart structure. As early as mid-gestation, a significant increase occurred in heart chamber thickness and cell number. As a result, the researchers determined that in normal hearts where Hippo genes are present, this pathway acts as a control to prevent overgrowth. Additional study found that in the heart, Hippo signaling inhibits Wnt signaling, a developmental program that promotes the expression of growth molecules.

“Our current interests are focused on exploring possible Hippo roles in postnatal regulation of heart size and regeneration, and the current data indicate that as an organ, the heart has limited regenerative capacity,” Dr. Martin said. “Our gene profiling data show Hippo mutant hearts exhibit high expression levels of genes implicated in regeneration. Perhaps if Hippo signaling can be altered clinically, hearts then may acquire the capacity to regenerate post-injury.”

Other contributors to the Science study from the TAMHSC-Institute of Biosciences and Technology were Todd Heallen, Min Zhang, Jun Wang, Margarita Bonilla-Claudio and Ela Klysik. Dr. Randy Johnson from The University of Texas M.D. Anderson Cancer Center also contributed.

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