Medical Xpress

Heart regenerates after infarction -- first trials with mice

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Up until today scientists assumed that the adult heart is unable to regenerate. Now, researchers and cardiologists from the Max Delbrück Center for Molecular Medicine (MDC) Berlin-Buch and the Charité – Universitätsmedizin Berlin (Germany) have been able to show that this dogma no longer holds true. Dr. Laura Zelarayán and Assistant Professor Dr. Martin W. Bergmann were able to show that the body`s own heart muscle stem cells do generate new tissue and improve the pumping function of the heart considerably in an adult organism, when they suppress the activity of a gene regulator known as beta-catenin in the nucleus of the heart cells.

The gene regulator beta-catenin plays an important role in the development of the heart in embyros. Dr. Zelarayán and Dr. Bergmann could now show that beta-catenin is also important for the regeneration of the adult heart. They suppressed this factor in the nucleus of the heart cells in mice.

This way they activated heart precursor cells (stem cells) to turn on the regeneration of heart in adult mice. Four weeks after blocking beta-catenin, the pumping function of the heart of the animals had improved and the mice survived an infarction much better than those animals with a functioning beta-catenin gene. An important contribution to this project has been a transgenic mouse line generated by Professor Walter Birchmeier`s (MDC) laboratory.

Markers identified for Heart Muscle Stem Cells

In addition, the researchers have proven that heart muscle stem cells exist. So far, these cells had not been characterized clearly. They could demonstrate that two markers for heart cells – the structural protein alpha myosin heavy chain and the transcriptionfactor Tbx5 - are also expressed on heart precursor cells. "The evidence of cells with these markers in the adult heart demonstrates that stem cells dating back from heart development survive in niches in the adult heart", Dr. Bergmann explains.

The researchers in Germany collaborated with scientists in the Netherlands and Belgium. For this research, Dr. Bergmann was awarded the Wilhelm P. Wintersteinpreis this summer. The research group of Dr. Bergmann, a guest researcher at the MDC who recently became Deputy of the Department of Cardiology at the Asklepios Clinic St. Georg in Hamburg, belongs to the research group of Professor Rainer Dietz (MDC and Charité).

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