Using own skin cells to repair hearts on horizon

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Robert Schwartz, Cullen Distinguished Professor of Biology and Biochemistry at the University of Houston, has pioneered a breakthrough technique for turning ordinary human skin cells into early-stage heart cells. Credit: Chris Watts

A heart patient's own skin cells soon could be used to repair damaged cardiac tissue thanks to pioneering stem cell research of the University of Houston's newest biomedical scientist, Robert Schwartz.

His new technique for reprogramming human skin cells puts him at the forefront of a revolution in medicine that could one day lead to treatments for Alzheimer's, diabetes, muscular dystrophy and many other diseases.

Schwartz brings his ground-breaking research to UH as the Cullen Distinguished Professor of Biology and Biochemistry and head of UH's

new Center for Gene Regulation and Molecular Therapeutics. He also is affiliated with the Texas Heart Institute at St. Luke's Episcopal Hospital in the Texas Medical Center, where he is director of stem cell engineering.

"Professor Schwartz's work will save lives, and his decision to pursue this pioneering research at UH is a big leap forward on our way to Tier-One status," said John Bear, dean of the UH College of Natural Sciences and Mathematics. "Together with the many other outstanding scientists we've assembled here, Schwartz will help make this university a major player in medical research."

Schwartz devised a method for turning ordinary human skin cells into heart cells. The cells developed are similar to embryonic stem cells and ultimately can be made into early-stage heart cells derived from a patient's own skin. These then could be implanted and grown into fully developed beating heart cells, reversing the damage caused by previous heart attacks. These new cells would replace the damaged cardiac tissue that weakens the heart's ability to pump, develops into scar tissue and causes arrhythmias. Early clinical trials using these reprogrammed cells on actual heart patients could begin within one or two years.

Although Schwartz is not the first scientist to turn adult cells into such stem cells, his improved method could pave the way for breakthroughs in other diseases. Schwartz's method requires fewer steps and yields more stem cells. Armed with an effective way to make induced stem cells from a patient's own skin, scientists can then begin the work of growing all kinds of human cells.

For example, new brain cells could treat Alzheimer's patients or those with severe brain trauma, or a diabetic could get new insulin-producing cells in the pancreas. Generating new kidney, lung or liver tissue is also possible, with scientists even being able to one day grow an entirely new

heart or other organ from these reprogrammed cells. Additionally, Schwartz and his team are working on turning induced stem cells into skeletal muscle cells to treat muscular dystrophy.

"We're trying to advance science in ways folks never even dreamed about," Schwartz said. "The idea of having your own bag of stem cells that you can carry through life and use for tissue regeneration is at the very cutting edge of science."

This latest biomedical hire is a major step in the UH Health Initiative, an effort aimed at having the university become a world-class center for medical research. Creating new cross-disciplinary academic and health-related research opportunities for faculty and students is crucial to this initiative, as are collaborations with other Texas Medical Center member institutions. One of its top goals is to increase the amount of sponsored research expenditures awarded to UH, which is a key factor in attaining Tier-One status.

"Dr. Schwartz will expand UH's expertise in promising new areas of scientific discovery to alleviate human disease. By recruiting premier scientists like Schwartz, UH is fast becoming a major player in the regional biomedical research community," said Kathryn Peek, assistant vice president of University Health Initiatives at UH.

Schwartz has decades of experience at the Texas Medical Center. Before coming to UH, he was director of the Institute of Biosciences and Technology, a research component of the Texas A&M Health Science Center. He also was a longtime tenured professor at Baylor College of Medicine and co-directed the school's Center for Cardiovascular Development. The new research center Schwartz heads at UH will be housed in state-of-the-art laboratory facilities at the university's Science and Engineering Research Center.

What attracted him to UH was the commitment of administrators and faculty to making the university a premier center for biomedical research. His hiring comes just a year after the arrival of Jan-Ĺke Gustafsson, a world-renowned scientist and cancer researcher. They join other leading UH faculty, ranging from biochemists to computer scientists and mathematicians, who are deeply involved in cutting-edge medical research.

Provided by University of Houston

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