Medical Xpress

Scientists create 'beating' human heart muscle for cardiac research

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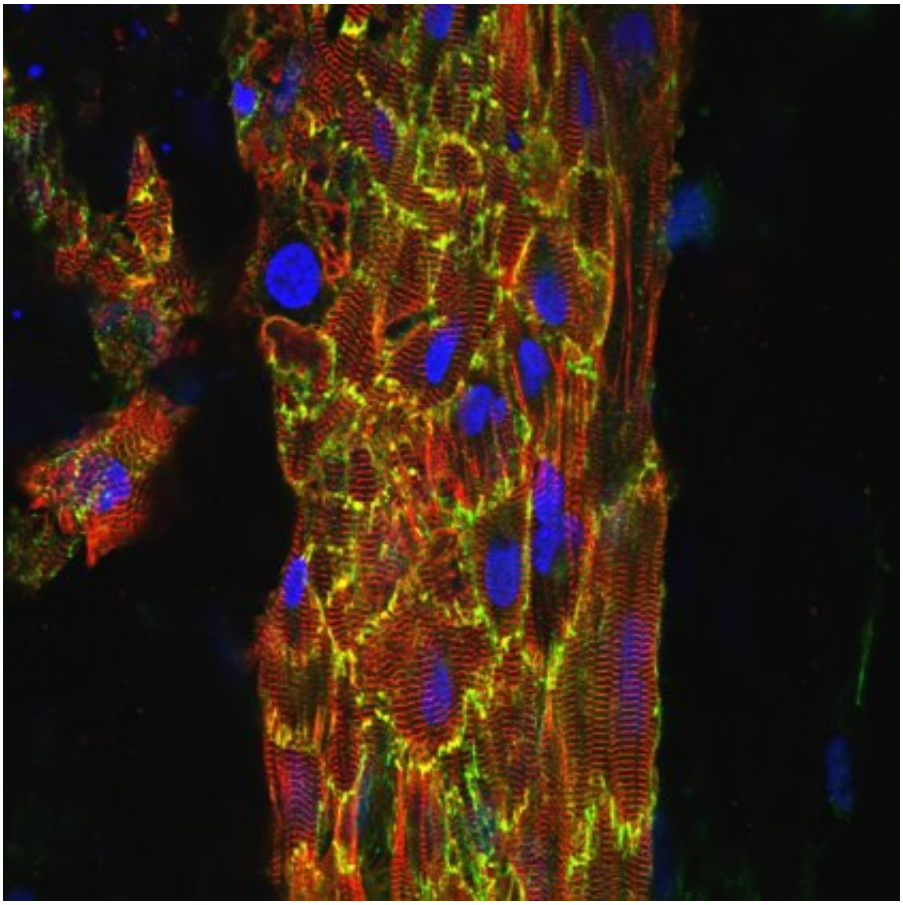

Credit: University of Queensland

Scientists at The University of Queensland have taken a significant step forward in cardiac disease research by creating a functional 'beating' human heart muscle from stem cells.

Dr James Hudson and Dr Enzo Porrello from the UQ School of Biomedical Sciences collaborated with German researchers to create models of human heart tissue in the laboratory so they can study cardiac biology and diseases 'in a dish'.

"The patented technology enables us to now perform experiments on human heart tissue in the lab," Dr Hudson said.

"This provides scientists with viable, functioning human heart muscle to work on, to model disease, screen new drugs and investigate heart repair."

The UQ Cardiac Regeneration Laboratory co-leaders have also extended this research and shown that the immature tissues have the capacity to regenerate following injury.

"In the laboratory we used dry ice to kill part of the tissue while leaving the surrounding muscle healthy and viable," Dr Hudson said.

"We found those tissues fully recovered because they were immature and the cells could regenerate – in contrast to what happens normally in the adult heart where you get a 'dead' patch.

"Our goal is to use this model to potentially find new therapeutic targets to enhance or induce cardiac regeneration in people with heart failure.

"Studying regeneration of these damaged, immature cells will enable us to figure out the biochemical events behind this process.

"Hopefully we can determine how to replicate this process in adult hearts for cardiovascular patients."

Each year, about 54,000 Australians suffer a heart attack, with an average of about 23 deaths every day.

The UQ research has been supported by the National Health and Medical Research Council (NHMRC) and the National Heart Foundation.

Heart Foundation Queensland CEO Stephen Vines said the charity was excited to fund such an important research project.

"Heart attack survivors who have had permanent damage to their heart tissue are essentially trying to live on half an engine," Mr Vines said.

"The research by Dr Hudson and Dr Porello will help unlock the key to regenerating damaged heart tissue, which will have a huge impact on the quality of life for heart attack survivors."

More information: Holly K. Voges et al. Development of a human cardiac organoid injury model reveals innate regenerative potential, *Development* (2017). DOI: 10.1242/dev.143966

Malte Tiburcy et al. Defined Engineered Human Myocardium with Advanced Maturation for Applications in Heart Failure Modelling and Repair, *Circulation* (2017). DOI: 10.1161/CIRCULATIONAHA.116.024145

Provided by University of Queensland

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