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3D heart tissue created for drug testing

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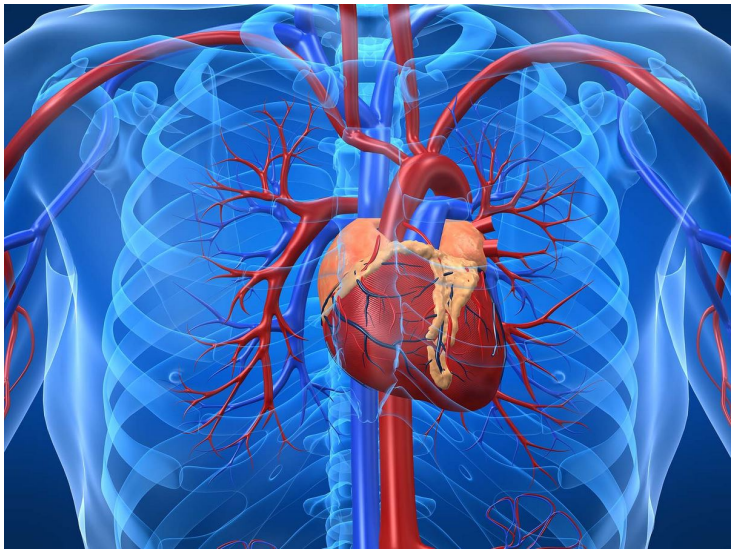

Researchers at the Institute of Bioengineering and Nanotechnology of A*STAR Singapore have engineered a three-dimensional heart tissue from human stem cells to test the safety and efficacy of new drugs on the heart.

Existing screening methods based on 2D cardiac structure cannot accurately predict drug toxicity, while the currently available 3D structures for screening are difficult to fabricate in the quantities needed for commercial application.

To solve this problem, the IBN research team fabricated their 3D heart tissue from cellular self-assembly of heart muscle cells grown from human induced pluripotent stem cells. They also developed a fluorescence labeling technology to monitor changes in beating rate using a real-time video recording system. The new heart tissue exhibited more cardiac-specific genes, stronger contraction and higher beating rate compared to cells in a 2D structure.

Using the 3D heart tissue, scientists were able to correctly predict cardiotoxic effects based on changes in the beating rate, even when these were not detected by conventional tests. The method is simple and suitable for large-scale assessment of drug side effects. It could also be used to design personalized therapy using a patient's own cells.

The researchers have filed a patent on their human heart tissue model, and hope to work with clinicians and pharmaceutical companies to bring this technology to market.