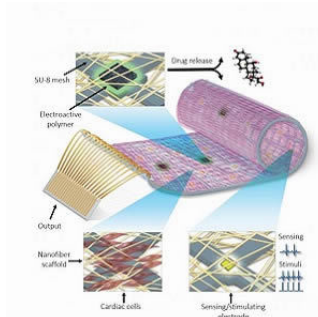


## Cyborg Patch to Treat Diseased Heart



Despite the fact that heart transplants are on the rise, there are still some 25 percent of people in the US who are still waiting for a heart and who could possibly die before receiving one. To date, there is no available alternative to this. But things may change in the future.

A new engineering innovation from Tel Aviv University called the Cyborg Heart Patch can single-handedly change the field of cardiac research. This bionic heart patch has both organic and engineered paths and its capabilities could even surpass those of human tissue alone. It contracts and expands like human heart tissue but also has the capability of regulating itself like a machine. Details about this invention are published in the journal *Nature Materials*.

"With this heart patch, we have integrated electronics and living tissue," Dr. Dvir said. "It's very science fiction, but it's already here, and we expect it to move cardiac research forward in a big way. Until now, we could only engineer organic cardiac tissue, with mixed results. Now we have produced viable bionic tissue, which ensures that the heart tissue will function properly."

Prof. Dvir's Tissue Engineering and Regenerative Medicine Lab at TAU has been working for the last five years by using sophisticated nanotechnologies to develop functional substitutes for tissue permanently damaged by heart attacks and cardiac disease. This new patch is one such innovation and could replace organic tissue while ensuring sound function through remote monitoring.

"We first ensured that the cells would contract in the patch, which explains the need for organic material," said Dr. Dvir. "But, just as importantly, we needed to verify what was happening in the patch and regulate its function. We also wanted to be able to release drugs from the patch directly onto the heart to improve its integration with the host body."

This new bionic patch could prove to be a viable alternative for transplantation and features electronics that can sense tissue function and provide electrical stimulation. Electroactive polymers are also integrated with the electronics and upon activation, they release medication on demand.

The Cyborg Patch can enable physicians to even log on and see their patient's condition in real time. They can view data that would be sent remotely from sensors that are embedded in this engineered tissue and can immediately assess how their patient is doing.

"The longer-term goal is for the cardiac patch to be able to regulate its own welfare. In other words, if it senses inflammation, it will release an anti-inflammatory drug. If it senses a lack of oxygen, it will release molecules that recruit blood-vessel-forming cells to the heart."

While a major breakthrough, Dr. Dvir cautions that it may still take some time for the practical realisation of this technology. He advises that a healthy lifestyle should be the target for everyone regardless of technological advancements and viable options.

Source: American Friends of TelAviv University

Image Credit: American Friends of TelAviv University

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