

## **A Facile and Safe, Suture-Free Technology, for the Attachment of Engineered Tissues to Organs (Ramot)**

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[Tal DVIR](#), T.A.U Tel Aviv University, Life Sciences, School of Molecular Cell Biology & Biotechnology

Engineered tissues are considered a promising approach for regenerating infarcted organs. For example, cardiac patches are prepared by seeding cardiac cells within a 3D biomaterial scaffold, which provide a physical, structural and biochemical supporting microenvironment. The scaffolds encourage cell-cell and cell-matrix interactions, which lead to the formation of a functioning tissue. Cardiac patches are usually attached to the scar tissue of the heart by a surgical operation, involving synthetic sutures or staples. Although these procedures can attach a patch to a desired site, this surgical approach suffers from several limitations, which include the blockage of blood supply to the patch, bleeding, injury to a healthy tissue and risk of infection.

### **OUR SOLUTION**

- We developed facile and safe, suture-free technology, made of new hybrid material comprised of fibrous electrospun scaffolds and AuNRs, for the attachment of engineered tissues to organs.
- Upon irradiation with near IR, the particles are locally heated, allowing efficient soldering, perhaps by melting the polymer, or by denaturation of albumin and collagen upon heating and their interlock providing an elegant, suture-free engraftment of a cardiac patch to the heart.
- Such technology may assist in the future to integrate various engineered tissues or pure biomaterials with any defected organ, minimizing the risk of additional injury for the patient caused by the conventional stitching methods or others.

### **ADVANTAGES:**

- Overcomes toxicity problem of other solutions (such as cyanoacrylates) and possible stiffness of the area covered by the glue.
- Surgical procedures of other approaches (sutures and staples) may elicit bleeding, avoided by this new technology.
- Other solutions of fusion of tissues by heating might be destructive for viability of cells. In addition, using of particles in a solution in combination with a three dimensional assembly of a tissue is limited. These limitations are avoided with this new innovative technology

### **PATENTS**

PCT patent application

### **REFERENCES**

Malki, M, et al. " Gold Nanorod-Based Engineered Cardiac Patch for Suture-Free Engraftment by Near IR." Nano letters 2018, 18, 7, 4069-4073

### **Contact for more information:**

Ariela Markel , VP Business Development, Healthcare , 02-6586608

Ramot at Tel Aviv University Ltd. P.O. Box 39296, Tel Aviv 61392 ISRAEL

Phone: +972-3-6406608

Fax: +972-3-6406675