

# ELECTROMECHANICAL STIMULATION FOR TISSUE ENGINEERING APPLICATIONS

## TECHNOLOGY APPROACH

The invention relates to the use of a new device for mechanical and/or electrical stimulation to be used with 2D monolayer and 3D stem cells cultures for tissue engineering applications. The device is disposable and allows sterile electromechanical stimulation on standard culture plates without breaking the sterile barrier.

## BACKGROUND

Cardiovascular diseases have a huge impact on population health. Heart failure is the end-stage of many cardiovascular diseases, but the leading cause is the presence of a large scar due to an acute myocardial infarction. Current treatments for repairing tissue rely on achieving in vitro cardiac differentiated cells that mimic the native cardiac electromechanical cell physiology. Electrical and mechanical stimulation of stem cell cultures may help to improve their cardiac differentiation and tissue structure formation. Current devices for electromechanical stimulation have major flaws on the use of standard laboratory sterilizing procedures.

## OUR TECHNOLOGY

The device presented enables the combination of both electrical and mechanical stimulation either independently or simultaneously.

The mechanical stimulation is performed with a non-invasive and aseptic novel approach. A sterile, single use device is placed into a standard culture plate. The cells are seeded in a volume contained in the central area of the device, which goes through mechanical stimulation thanks to the embedded magnets and the external magnetic field.



*Complete results upon CDA signature.*

## ADVANTAGES

- **Mechanical and/or simultaneous electrical stimulation** on standard culture plates.
- The device can be fully **sterilized** prior cell culture seeding or may be sold directly pre-sterilized for immediate use.
- The benefits of the electromechanical stimulation can be non-destructively and on-line monitored using **Electrical Impedance Spectroscopy**.

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## INTELLECTUAL PROPERTY

PCT Application

LOOKING FOR: • Licensing Out  
• Co-development

## PRODUCT PROFILE

Category	Target Product Profile
Clinical Indication	Cardiac diseases (such as heart failure)
Application	2D monolayer and 3D stem cells cultures for tissue engineering
Aim	In vitro cell conditioning of therapeutic cells for further clinical cell therapy

## INVENTORS

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- Aida Llucià-Valldeperas
- Dr. Bragos Bardia
- Dr. Rosell-Ferrer
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## PUBLICATIONS

### 1. Electrical stimulation of cardiac adipose tissue-derived progenitor cells modulates cell phenotype and genetic machinery.

Llucià-Valldeperas A, Sanchez B, Soler-Botija C, Gálvez-Montón C, Prat-Vidal C, Roura S, Rosell-Ferrer J, Bragos R, Bayes-Genis A.

J Tissue Eng Regen Med. 2013 Feb 19. doi: 10.1002/term.1710

### 2. Physiological conditioning by electric field stimulation promotes cardiomyogenic gene expression in human cardiomyocyte progenitor cells.

Llucià-Valldeperas A, Sanchez B, Soler-Botija C, Gálvez-Montón C, Roura S, Prat-Vidal C, Perea-Gil I, Rosell-Ferrer J, Bragos R, Bayes-Genis A.

Stem Cell Res Ther. 2014 Aug 4;5(4):93. doi: 10.1186/scrt482.

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