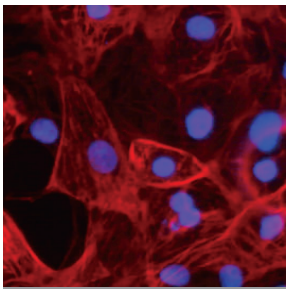


Stem Cell Application Protocol

Application of Cellartis® Cardiomyocytes in CardioExcyte® 96 for Impedance and EFP recordings

that's GOOD science!

I. Introduction

Cellartis Cardiomyocytes (from ChiPSC22) are derived from human induced pluripotent stem cells and provide a promising physiologically-relevant, human model for pre-clinical safety evaluation and drug screening. The hybrid instrument CardioExcyte 96 allows for both impedance readout and extracellular field potential (EFP) recordings in high throughput format. Cellartis Cardiomyocytes used in combination with this technique form an excellent platform to accurately predict cardiotoxic responses and to screen compound efficacy.

II. Materials Required

- Cellartis Cardiomyocytes (from ChiPSC22) Kit (Takara Bio, Cat. No Y10075)
  - Cellartis Cardiomyocytes (from ChiPSC22)
  - Cellartis CM Thawing Base
  - Cellartis CM Culture Base
- Fetal Bovine Serum (FBS) (Life Technologies, Cat. No. 16140)
- Y-27632
- Fibronectin (Sigma-Aldrich, Cat. No. F0895)
- CardioExcyte 96 Sensor Plate (Cat. No. 20 1001, Nanion Technologies)
- PBS Dulbecco's with Ca^{2+} & Mg^{2+} (D-PBS +/+)
- CardioExcyte 96 instrument (Nanion Technologies)
- General cell culture equipment used in cell culture laboratory

III. Protocol

NOTE: Avoid contact with the electrodes in all of the following procedures as they are fragile. These procedures should be performed under aseptic conditions as much as possible.

A. Coating of the CardioExcyte 96 Sensor Plate

1. Dilute the required volume of Fibronectin in D-PBS +/+ to a final concentration of 10 µg/ml.
2. Add the diluted Fibronectin solution into each well to be used. Use 50 µl/well.
3. Incubate at 37°C for a minimum of 1.5 hours.

4. Aspirate the Fibronectin solution from the cell culture plate just before use.

B. Medium Preparation

. Preparing Cellartis CM Thawing Medium

1. Thaw Cellartis CM Thawing Base.
2. Decontaminate the external surface of all bottles with an appropriate disinfectant and place into the biological safety cabinet.
3. Add 8 ml FBS per 32 ml Cellartis CM Thawing Base to achieve Cellartis CM Thawing Medium.
4. Cellartis CM Thawing Medium should be stored at 4°C and expires one month after the date of preparation.
5. Always discard any leftover warmed Cellartis CM Thawing Medium.

. Preparing Cellartis CM Thawing Medium with Y-27632

1. On the day of use, prepare Cellartis CM Thawing Medium with Y-27632 by adding Y-27632 to a final concentration of 10 µM to Cellartis CM Thawing Medium.
2. Cellartis CM Thawing Medium with Y-27632 should be used on the day of preparation.

. Preparing Cellartis CM Culture Medium

1. Thaw Cellartis CM Culture Base.
2. Decontaminate the external surface of supplement and medium bottle with appropriate disinfectant and place into the biological safety cabinet.
3. Add 10 ml FBS per 90 ml Cellartis CM Culture Base to achieve Cellartis CM Culture Medium.
4. Cellartis CM Culture Medium should be stored at 4°C and expires one month after the date of preparation.
5. Always discard any leftover warmed Cellartis CM Culture Medium.

C. Thawing and Plating of Cellartis Cardiomyocytes

NOTE: It is recommended that not more than two to three vials are thawed at once.

NOTE: For your protection, wear a protective face mask and protective gloves. Use forceps when handling a frozen vial. Never hold the vial in your hand as it may explode due to rapid temperature changes.

1. Prepare the appropriate volume of Cellartis CM Thawing Medium with Y-27632 (see Section B) and warm to room temperature (RT, 15–25°C).
2. Transfer, as quickly as possible, the frozen vial from liquid nitrogen to a 37°C ± 1°C water bath using forceps.
3. Thaw the cells by gently pushing the vial under the surface of the water, without swirling the vial. Do not submerge the cap of the vial in the water bath as this could contaminate the cells.
4. Take the vial out of the water bath as soon as the thawing is completed (approximately 3 min; the vial should still be cold on the outside).
5. Wipe the vial with an appropriate disinfectant and place into the biological safety cabinet.
6. As soon as possible, gently transfer the cell suspension into a sterile 50 ml tube by using a pipette.
7. Rinse the vial with 1 ml of Cellartis CM Thawing Medium with Y-27632 and carefully add it to the cell suspension dropwise.
8. Add 8 ml of Cellartis CM Thawing Medium with Y-27632 dropwise. Gently swirl the tube a few times in between.
9. Centrifuge the tube at 200*g* for 5 min at RT and remove the supernatant.
10. Carefully re-suspend the cell pellet with Cellartis CM Thawing Medium with Y-27632, using 6 ml medium per thawed vial.
11. Count the cells and measure viability.

12. Adjust the number of viable cells to 1.5–2.0 x 10^5 cells/ml with Cellartis CM Thawing Medium with Y-27632.

> **NOTE:** It is recommended to remove the coating solution and add the cell suspension column by column. Preparing more wells at a time might result in a drying of the surface, resulting in crystallization of the fibronectin and damaging of the cells afterwards.

13. Aspirate the Fibronectin solution from the first column.
14. Carefully mix your cell suspension and pipet 200 µl into each well (corresponding to 3–4 x 10^4 cells/well).
15. Proceed rapidly with the remaining columns.
16. Place the plate in the incubator (37°C ± 1°C, 5% CO2, and >90% humidity).

D. Medium change

It is recommended to do the first medium change 24 ± 2 hrs. after thawing and plating, and further on day 2, 3 and 4. From day 4 and onwards, it is sufficient to do a medium change every other day.

. Medium preparation

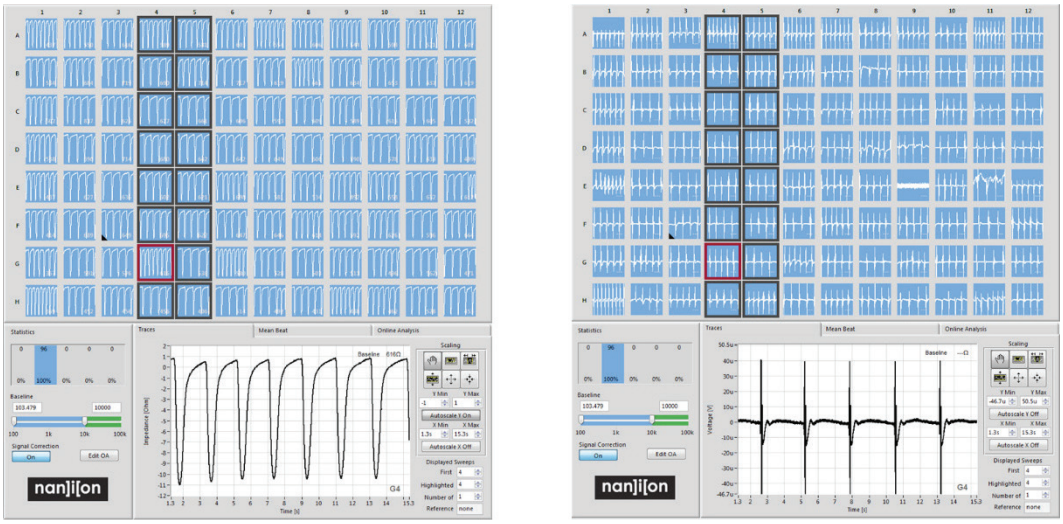
1. Prepare the appropriate volume of Cellartis CM Culture Medium as described in section B and warm to 37°C ± 1°C before use.

. Medium change

> **NOTE:** Work very gently in order not to detach the cells.

1. Aspirate 100 µl medium per well column-by-column and add 100 µl of fresh medium. Be careful not to touch the electrodes on the bottom of the well.
2. Repeat bullet 1 one time for each well (column-by-column).
3. Place the plate in the incubator (37°C ± 1°C, 5% CO2, and >90% humidity).

> **NOTE:** Impedance signals are maximal on approximately day 8 post-thaw, while optimal EFP T-waves are detected later, usually on day 9-10. For application of compounds, monitor the T-wave development and add compounds when it can be detected.



Impedance traces (left) and extracellular field potentials (right) from Cellartis Cardiomyocytes, showing strong beating and synchronized monolayers as well as high expression levels of cardiac ion channels in all 96 wells.

PRODUCTS

Cat. #	Product	Size
Y10075	Cellartis Cardiomyocytes (from ChiPSC22)	1 kit

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We are committed to developing and providing optimal tools that are tailored to your projects. To ensure your success, our Cellartis iPS Cell Services team delivers professional expertise through close collaboration.

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