The force-frequency relationship in cardiac muscle contraction is different in developmental maturation and pathological states. Hence, cardiac contraction can be utilized for the evaluation of chemical compounds especially when these compounds affect the beating rate.

In this study, various chemical stimulations on the contraction of human iPSC-derived cardiomyocytes ReproCardio2™ were examined with electrophysiological assay as well as calcium-imaging. ReproCardio2™ possess stable BPM and regular QT interval with minimum differences between cell-lots after been thaw from cryopreservation. With the addition of chemical compounds, the extension or reduction of QT-interval can be obtained by both electrophysiological assay and calcium-imaging. Other novel utility of ReproCardio2™ has also been developed. Taken together, ReproCardio2™ can be utilized in large-scale screening of large-scale of chemical compounds.

Electrophysiological assay

Materials and Methods

ReproCardio2™ KIT (1 full kit for 96 well plate: ReproCELL # RCESD008)

1. 3.3x10⁶ Single cells x 3 cryo-preserved vials
2. Empty Cryo-preserved Cell vial (dummy)
3. Maintenance culture medium (90mL) x 2
4. Coating solution (30mL) x 1
5. Low attachment plate for aggregated cells
6. Attachment plate for Thin-layer / Single cell

Immunocytochemistry

1. Primary antibody: anti-Conexin 43, MYH6/7(Sigma); anti-MLC-2A/2V (Synaptic systems); anti-Troponin (A Bio-Rad company) and anti-Vimentin (Millipore).
2. Secondary antibody: Alexa Fluor 488 (Life Technologies)

Electrophysiological assay

Calcium-imaging assay

Conclusion & Discussion

Human iPSC cell-derived cardiomyocytes ReproCardio2™ displays no differences between cell-lots, and exhibits constant affects of the drug screening even with different analyzing methods. The utility of ReproCardio2™ is also expandable. This demonstrated that ReproCardio2™ is suitable for the large-scale screening of chemical compounds.