Supporting information

Human Induced Pluripotent Stem Cell-derived Cardiac Tissue on a Thin Collagen Membrane with Natural Microstructures

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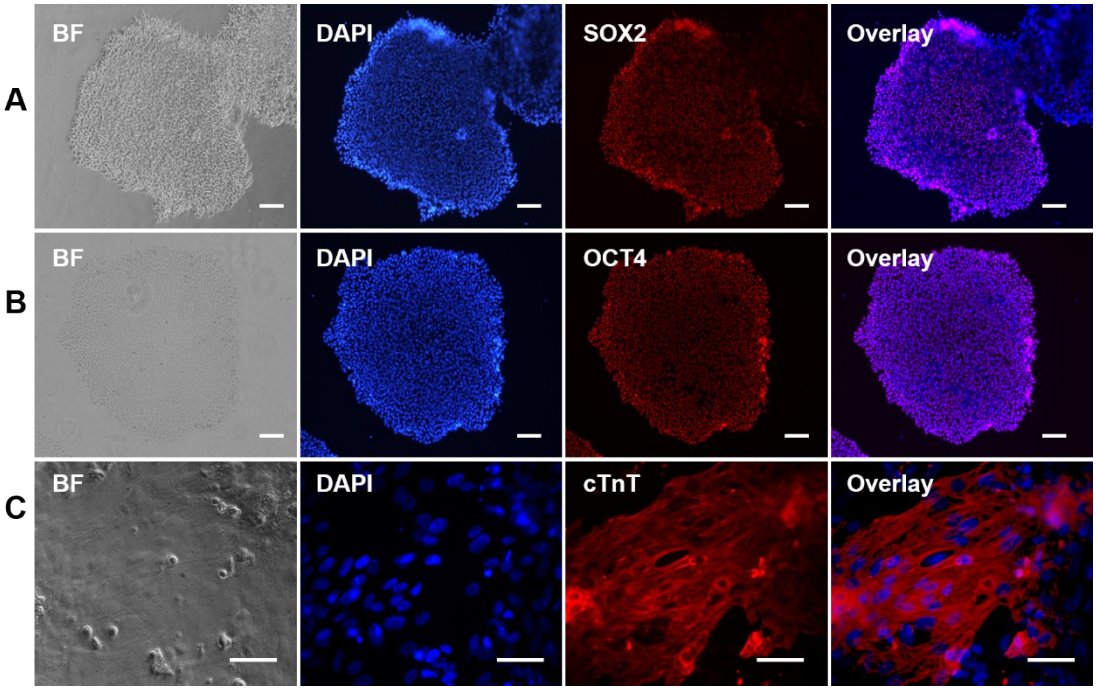
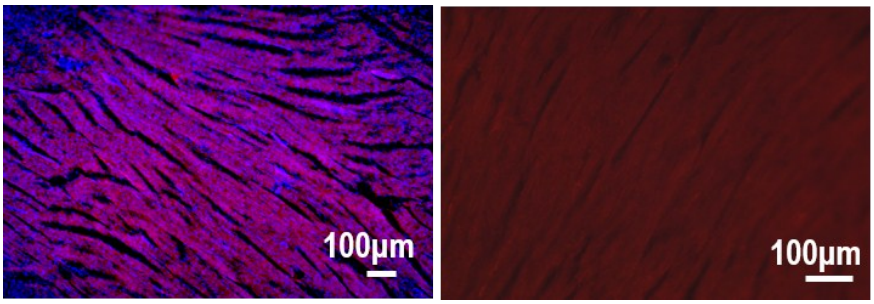
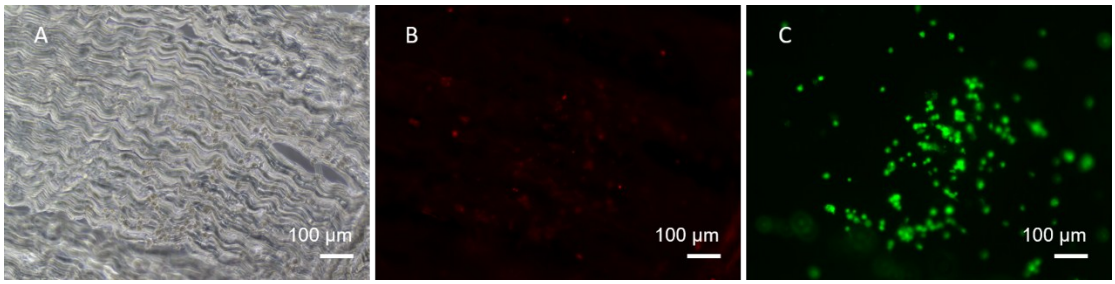


Supplemental figure 1. The identification of hiPSCs and hiPSCs derived cardiomyocytes by immunofluorescence analysis. **A and B:** SOX2 and OCT4 (pluripotency markers) were detected in nuclei. The nuclei were stained by DAPI. Scale bar = 100 µm. **C:** Cardiac marker, cTnT, is positive in cardiomyocytes. The nuclei were stained by DAPI. Scale bar =50 µm.

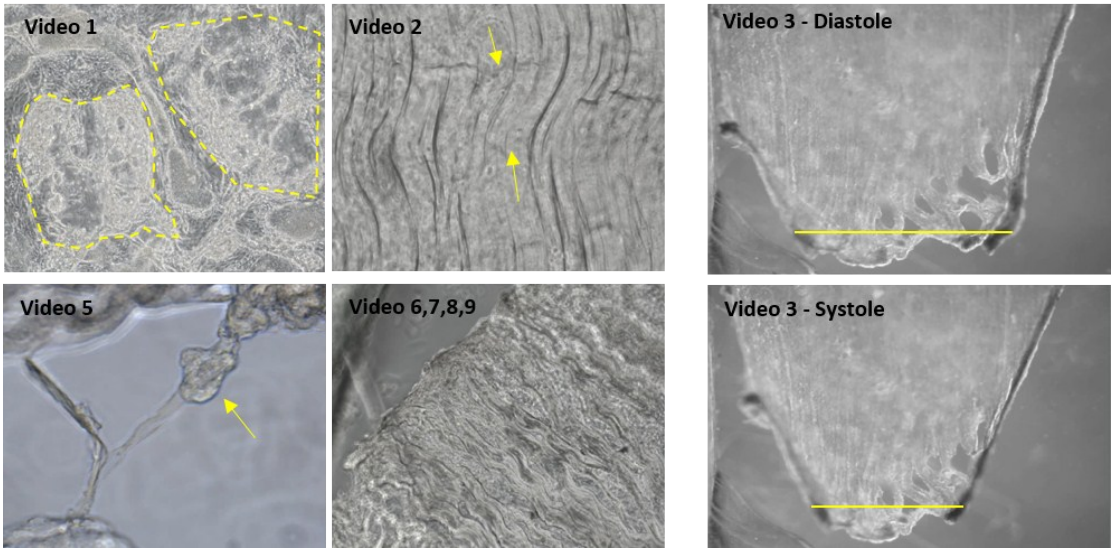


Supplemental figure 2. The immunofluorescence analysis of rat cardiac tissue. The cardiac tissue analyzed with collagen I antibody and DAPI staining. The rat cardiac tissues express collagen I. The right image demonstrated the decellularized cardiac tissue of rat.



Supplemental figure 3. The cell viability assay on the collagen membrane. A: Bright image under light microscope. **B:** Dead cells were stained using ethidium homodimer (EthD-1) which represented red. **C:** Live cells were stained using Calcein-AM (CAM) which represented green. The cell viability were measured using the formulas as follows: Cell viability =100% x live cells /(live cells + dead cells). The percentage of live cells in this study was 87.98%. Three replicate engineered cardiac tissues were tested and three fields per group were selected to count the number of

live and dead cells. n=3.



Supplemental figure 4. The collection of video images. The yellow dotted lines in video 1 represent the beating cardiomyocytes. The yellow arrows in video 2 and 5 represent the direction of the cardiomyocytes movement along the collagen fibers. The yellow arrow in video 5 represents the movement of single cell on collagen fibers. The yellow straight lines in video 3 represent the displacement of thin collagen membrane in relaxation phase and contraction phase.

Supplemental video 1. The differentiation of cardiomyocytes from human iPSCs on plate.

Supplemental video 2, 3. The cardiomyocytes on decellularized collagen membrane with normal medium after seeding for one month.

Supplemental Gif figure 4. The 3D confocal images of engineered cardiac tissue.

Supplemental video 5. The engineered cardiac tissues using ultra-thin collagen membrane.

Supplemental video 6. The engineered cardiac tissues treated with isoproretenol.

Supplemental video 7. The engineered cardiac tissues treated with metoprolol.

Supplemental video 8. The engineered cardiac tissues treated with isoproretenol after metoprolol treatment.

Supplemental video 9. The engineered cardiac tissues treated with normal medium after treated with drug.