

Description of additional supplementary files

Supplementary Movie 1. Fluo-8 AM staining to demonstrate the calcium transients in the primary-channel region of LVD neonatal rat cardiac tissues after 5 days of culture.

Supplementary Movie 2. Fluo-8 AM staining to demonstrate the calcium transients in the branch-channel region of LVD neonatal rat cardiac tissues after 5 days of culture.

Supplementary Movie 3. Fluo-8 AM staining to demonstrate the calcium transients in the primary-channel region of control neonatal rat cardiac tissues after 5 days of culture.

Supplementary Movie 4. Fluo-8 AM staining to demonstrate the calcium transients in the branch-channel region of control neonatal rat cardiac tissues after 5 days of culture.

Supplementary Movie 5. Beating of LVD cardiac tissue from hiPSC-CMs after 2 days of culture.

Supplementary Movie 6. Delivery and fibrin-based fixation of 3D LVD constructs to the *ex-vivo* porcine heart.