*Supplementary Material*

**3D bioprinting of dECM-incorporated hepatocyte spheroid for simultaneous promotion of cell-cell and -ECM interactions**

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**Supplementary Table**

**Table S1. Primer sequences used for primary mouse hepatocyte**

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| --- | --- | --- |
| **Gene** | **Forward (5'-3')** | **Reverse (5'-3')** |
| *ALB* | AGCCCACTGTCTTAGTGAGG | TCTTGCACACTTCCTGGTCC |
| *HNF4A* | CTAACACGATGCCCTCTCAC | GCAGGAGCTTGTAGGATTCAG |
| *CPS1* | AAGTAGAGATGGACGCTGTTG | CTTGGCTGATGGTCTGTGTAG |
| *UGT1A1* | AGATTACCCCAGGCCCATC | ATGGCTTTCTTCTCCGGAAT |
| *CYP1A2* | ATAACTTCGTGCTGTTTCTGC | ACCGCCATTGTCTTTGTAGT |
| *CYP1B1* | ATTCTCAGTGGGCAAACGG | GGATTCTAAACGACTTGGGCT |
| *CYP2E1* | GGAATGGGGAAACAGGGTAAT | GCACAGCCAATCAGAAAGGT |
| *CYP3A11* | TGGTCAAACGCCTCTCCTTGCTG | ACTGGGCCAAAATCCCGCCG |
| *GAPDH* | TGCCCCCATGTTTGTGAT | TGTGGTCATGAGCCCTTC |

**Supplementary Figures**

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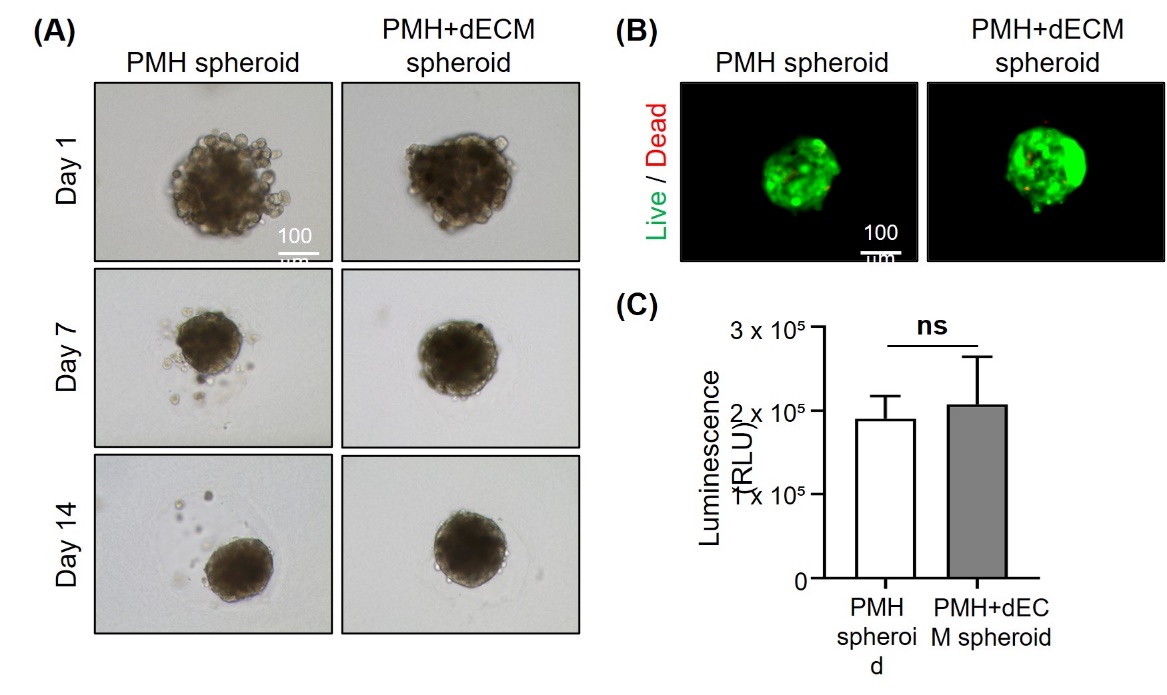
**Supplementary Figure 1. Characterization of dECM materials.** (A) Gross view (upper) and H&E staining results (lower) of native and decellularized porcine liver tissues. Measured DNA (B), GAGs (C) and collagen (D) contents of the native and dECM material.

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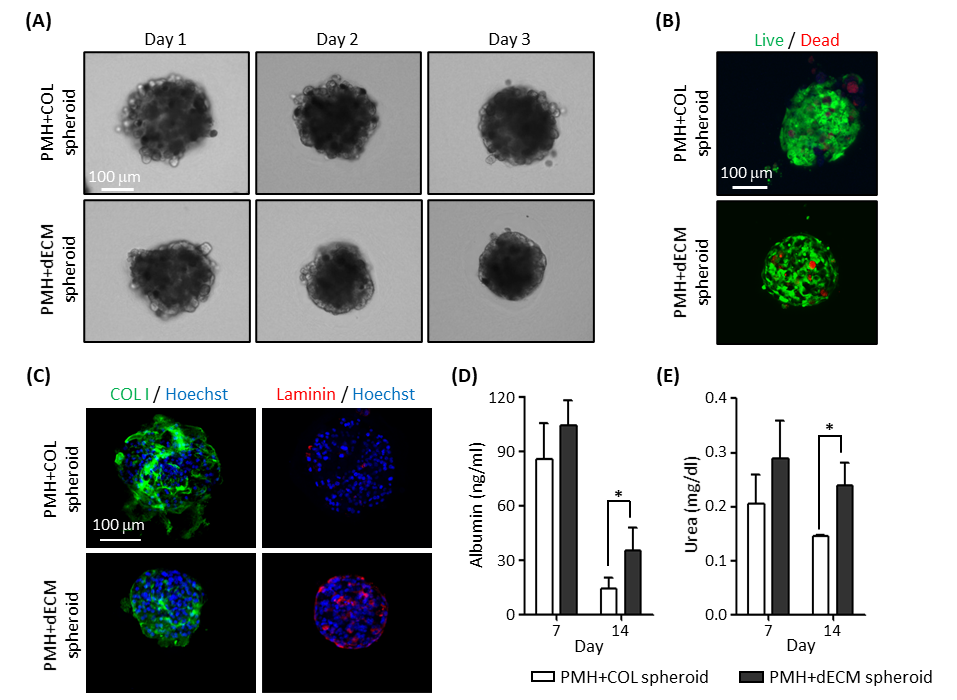
**Supplementary Figure 2. Rheological property of dECM-based cell bio-inks and matrix ink.** Viscosities of the dECM-based cell bio-inks (gelatin concentration: 12.5 mg/ml, 22.5 mg/ml, 32.5 mg/ml) and matrix ink were measured according to the change in shear rate (n=3).

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**Supplementary Figure 3. Measured diameters of bioprinted, dECM-incorporated PMH spheroids in the variation of dECM concentration.** After printing, the diameters were measured on day 3 (n=20, \*\*p < 0.01, \*\*\*p < 0.001).



**Supplementary Figure 4. Morphology and viability of the bioprinted dECM-incorporated PMH spheroids.** Optical microscope images of PMH spheroid group and 0.5% w/v dECM group during 14 days culture (A). The live/dead staining (B) and CellTiter-Glo cell viability assay (C) of PMH spheroid group and 0.5% w/v dECM group was conducted on day 7 after printing (n=3, ns: not significant).

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**Supplementary Figure 5. Bioprinted, collagen- and dECM-incorporated PMH spheroids and their hepatic functions.** Optical microscope images (A) and live/dead staining results (B) of collagen- and dECM-incorporated PMH spheroids. The live/dead staining was conducted on day 3 after printing. (C) Immunostaining results of the spheroids on day 3. Measured albumin (D) and urea (E) secretions of the spheroids on day 7 and 14 (n=5, \*p < 0.05).