Supporting Information

Hydrogel Encapsulation Facilitates Rapid-Cooling Cryopreservation of Stem Cell-Laden Core-Shell Microcapsules as Cell-Biomaterial Constructs

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Movie Captions

Movie S1. Cell encapsulation with a self-made tube-in-tube capillary microfluidic device

Movie S2. Collection of the cell-laden core-shell structured microcapsules

Movie S3. Rapid cooling of the microencapsulated cells in conventional plastic straws

Movie S4. Rewarming of the cryopreserved microencapsulated cells in conventional plastic straws

Supplementary Figures

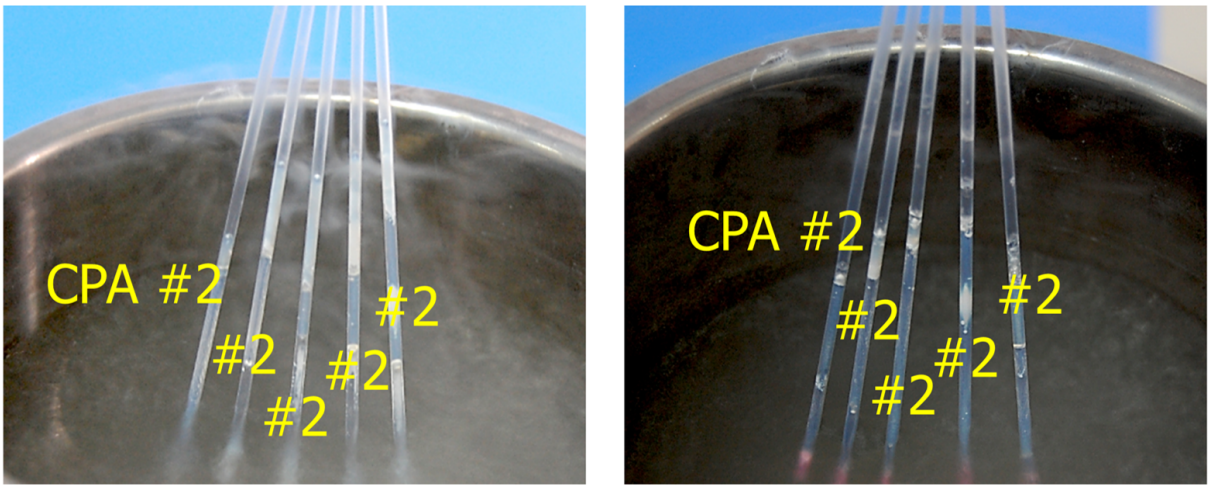

Figure S1. Typical pictures showing partial vitrification of CPA #2 in ten plastic straws

Supplementary Tables

Table S1. Size dependence of the microcapsules on the flow rates

Flow Rate (μL min^{-1}) (core-shell-oil)	Diameter (μm) Mean ± SD (n)	Shell thickness (μm) Mean ± SD (n)
10-20-600[&]	525.3±51.4 (84)	-
10-20-300[&]	682.4±63.9 (78)	-
10-20-150[&]	832.8±64.4 (70)	-
10-10-600	480.3±6.0 (89)	35.3±4.8 (79)
10-20-600	525.9±8.6 (63)	53.5±6.6 (60)
10-30-600	545.1±10.1 (64)	75.0±8.9 (81)

[&] the shell thicknesses of these microcapsules were not measured.

Table S2. Viability of pADSCs post CPA treatment or cryopreservation

Group	Viability (%) (Mean ± SD, n)	
	W/O Encap	**W/ Encap**
Fresh (Control)	96.5±1.3 (5)	-
CPA Treatment	92.7±1.2 (5)	94.0±1.1 (4)
CPA #1	23.7±4.6 (5)	73.1±5.1 (4)
CPA #2	25.2±3.6 (5)	70.9±5.0 (10)
CPA #3	25.0±4.6 (5)	62.8±6.5 (4)
CPA #4	21.4±3.6 (4)	55.8±4.6 (7)

Table S3. Genes, primers, and the NCBI registry numbers of the genes used for qRT-PCR study of pADSCs

Gene		Primer	NCBI registry number
pOCT4	Forward	TCGCCAGAAGGGCAAAC	NM_001113060.1
	Reverse	CAGGGTGGTGAAGTGAGGG	
pSOX2	Forward	CCGTGGTTACCTCTTCTTCCC	NM_001123197.1
	Reverse	TACCGTTGATGGCCGTGCC	
pKLF4	Forward	ACACCTGCGAACCCACACA	NM_001031782.2
	Reverse	GCGGTAGTGCCTGGTCAGTT	
pNANOG	Forward	AGCCCCAGCTCCAGTTTCAGC	NM_001129971.1
	Reverse	AATGATCGTCACATATCTTCAGGCTGTA	
pGapdh	Forward	GCAATGCCTCCTGTACCACC	AF017079.1
	Reverse	TCACGCCACAGTTTCCCAG	