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Supporting Information

Concentrated Polymer Brush-Modified Cellulose Nanofibers Promotes Chondrogenic Differentiation of Human Mesenchymal Stem Cells by Controlling Self-Assembly

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Table S1. Primers used in qPCR analysis

Gene	Forward primer (sequence 5' to 3')	Reverse primer (sequence 5' to 3')
GAPDH	AAGGTGAAGGTCGGAGTCAAC	GGGGTCATTGATGGCAACAATA
Collagen I	CGGCTCCTGCTCCTCTTAG	CACACGTCTCGGTCATGGTA
Collagen II	GGCAATAGCAGGTTCACGTACA	CGATAACAGTCTTGCCCCACTT
Aggrecan	TCGAGGACAGCGAGGCC	TCGAGGGTGTAGCGTGTAGAGA
SOX 9	GTACCCGCACTTGCACAAC	GTAATCCGGGTGGTCCTTCT
COMP	AGCAGATGGAGCAAACGTATTG	ACAGCCTTGAGTTGGATGCC

Table S2. Characteristics of CNF with PSSNa brush used in this work.

Entry	M_n	M_w/M_n	$M_{n,c}$[a]	σ[b] (chains/nm^2)	σ^*[c]	Brush Type
1	9200	1.1	11100	0.7	0.9	CPB
2	9800	1.2	14800	0.7	0.9	CPB

[a]Theoretical molecular weight calculated by the equation, $M_{n,c} = [SSNa]_0/[EBIB]_0 \times$ conversion $\times$ molecular weight of SSNa. [b]Graft density of PSSNa estimated by FT-IR measurement. [c]Dimensionless graft density. When $\sigma^* > 0.1$, the brush can be categorized into CPB.

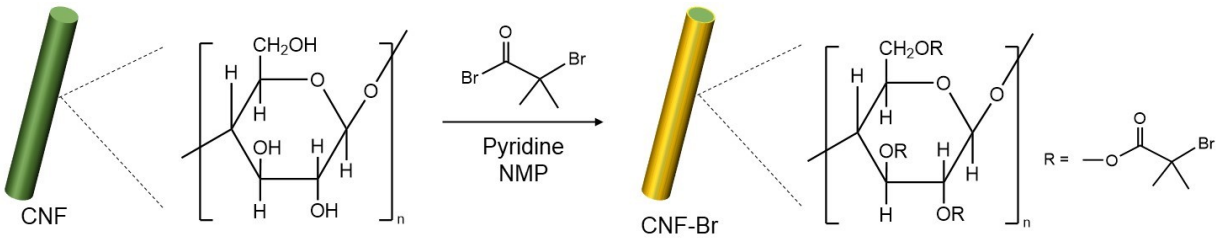

Figure S1. Preparation of CNF-Br by esterification.

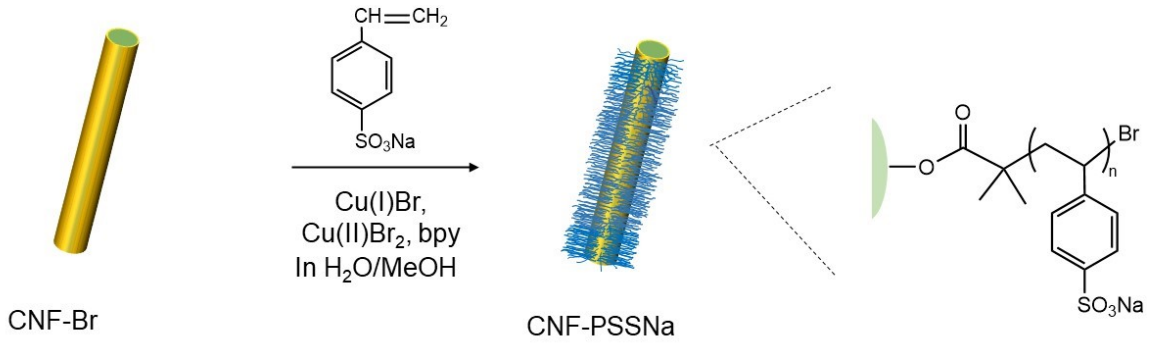

Figure S2. SI-ATRP of SSNa from CNF-Br.

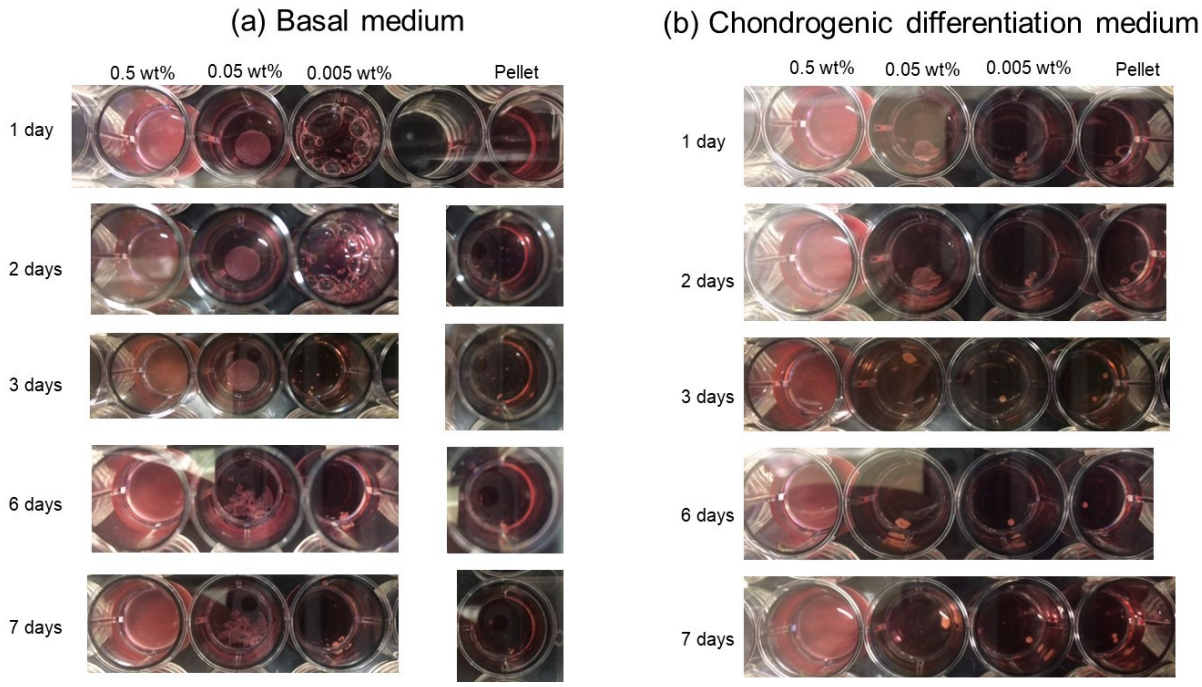

Figure S3. Photos of flocs and pellets (control). $[\text{CNF-CPB}]_0 = 0.5$, 0.05 and 0.005 wt%. $[\text{hMSC}]_0 = 5\times10^5$ cells/well. Cell culture using (a) basal medium and (b) chondrogenic differentiation medium. The scale bar = 500 μm.

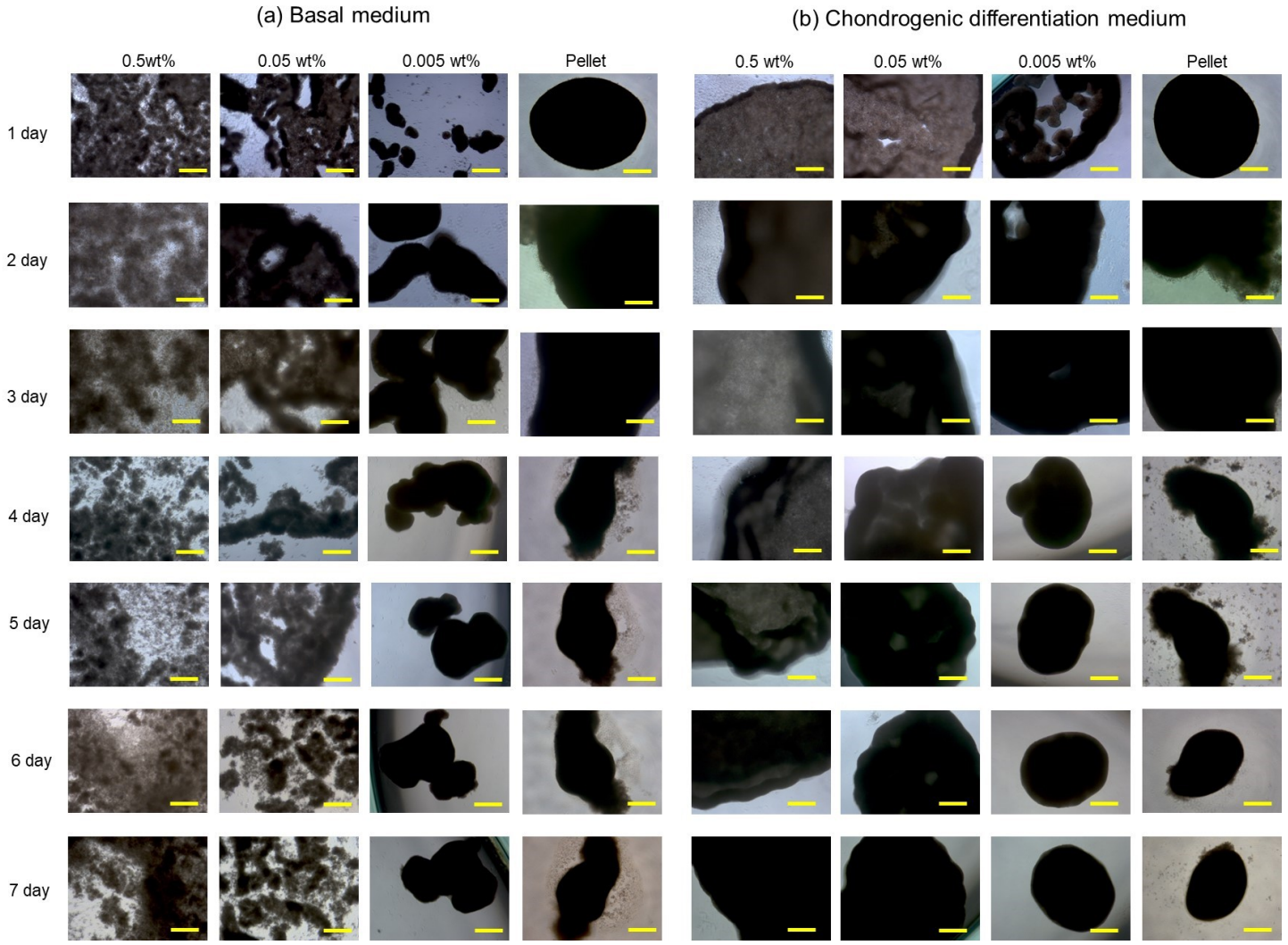

Figure S4. Phase contrast micrograms of flocs and pellets. $[CNF\text{-}CPB]_0$ = 0.5, 0.05 and 0.005 wt%. $[hMSC]_0 = 5\times10^5$ cells/well. Cell culture using (a) basal medium and (b) chondrogenic differentiation medium. The scale bar = 500 μm.

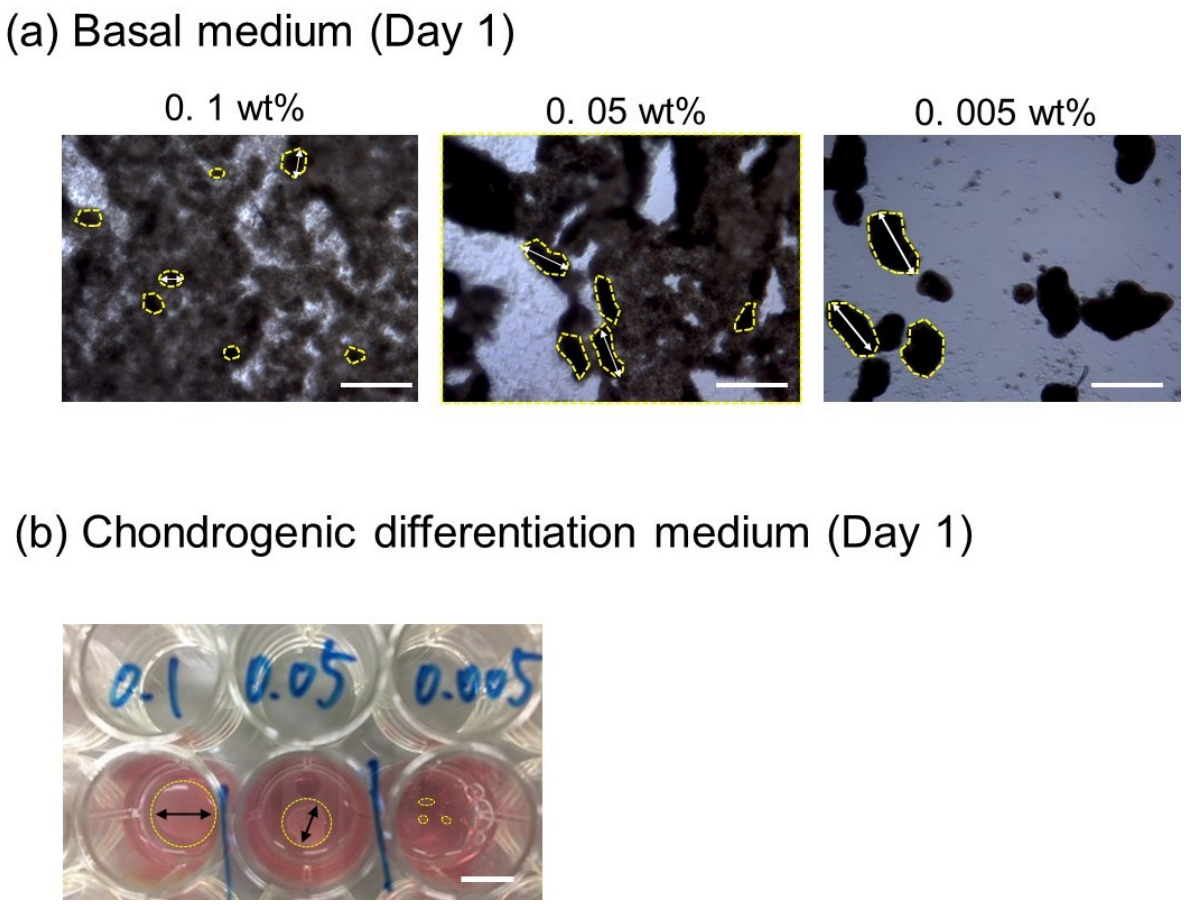

Figure S5. Examples of measuring floc sizes using the longest inner diameters (indicated by arrows). Representative flocs are indicated by dotted yellow circles. Scale bar = (a) 500 μm and (b) 10 mm.

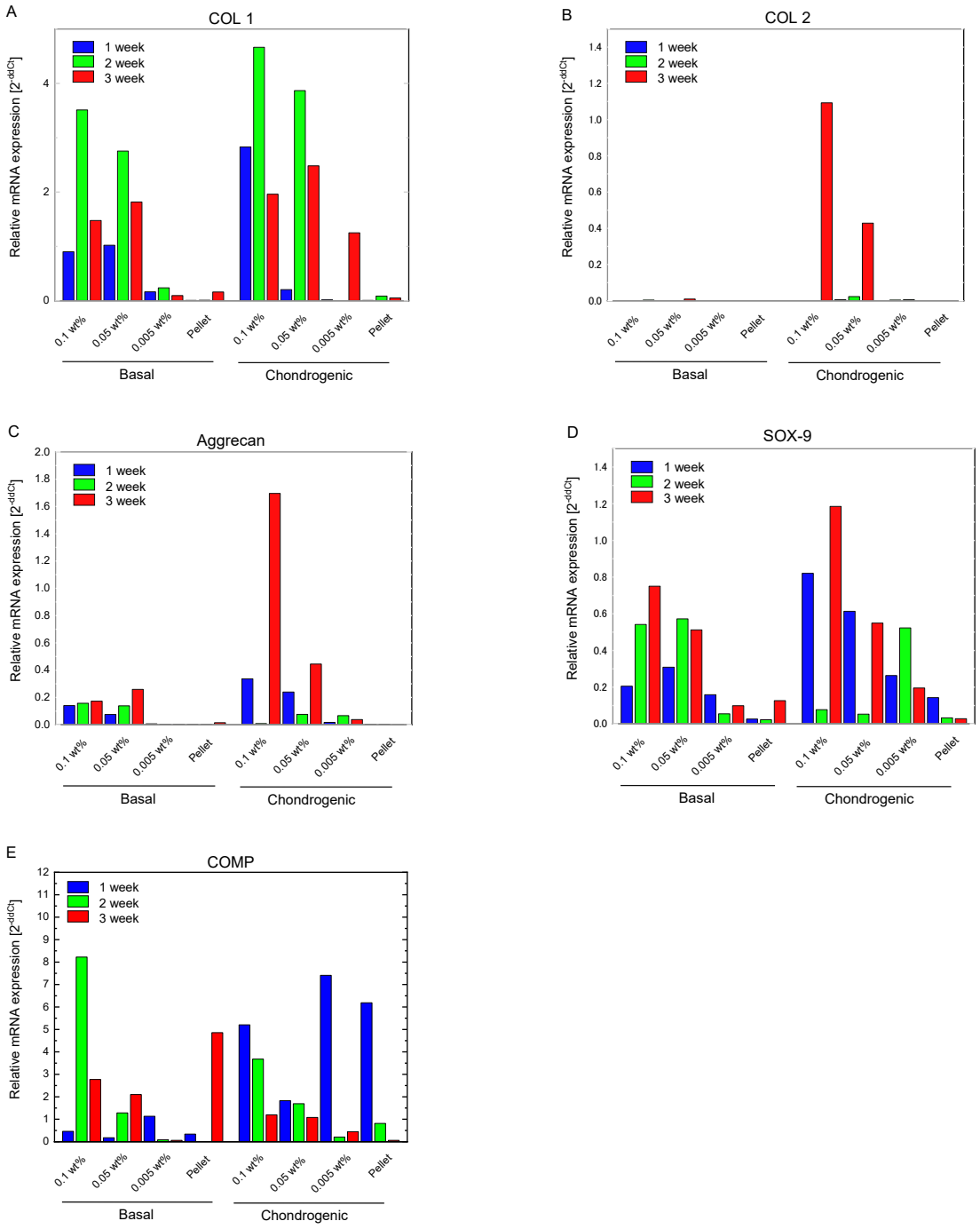

Figure S6. RT-qPCR measurements of chondrogenesis of hMSC/CNF-CPBs and pellet culture (control). (A)-(E) The fold-changes of target gene (COL 1, COL 2, Aggrecan, SOX-9, and COMP) expression.