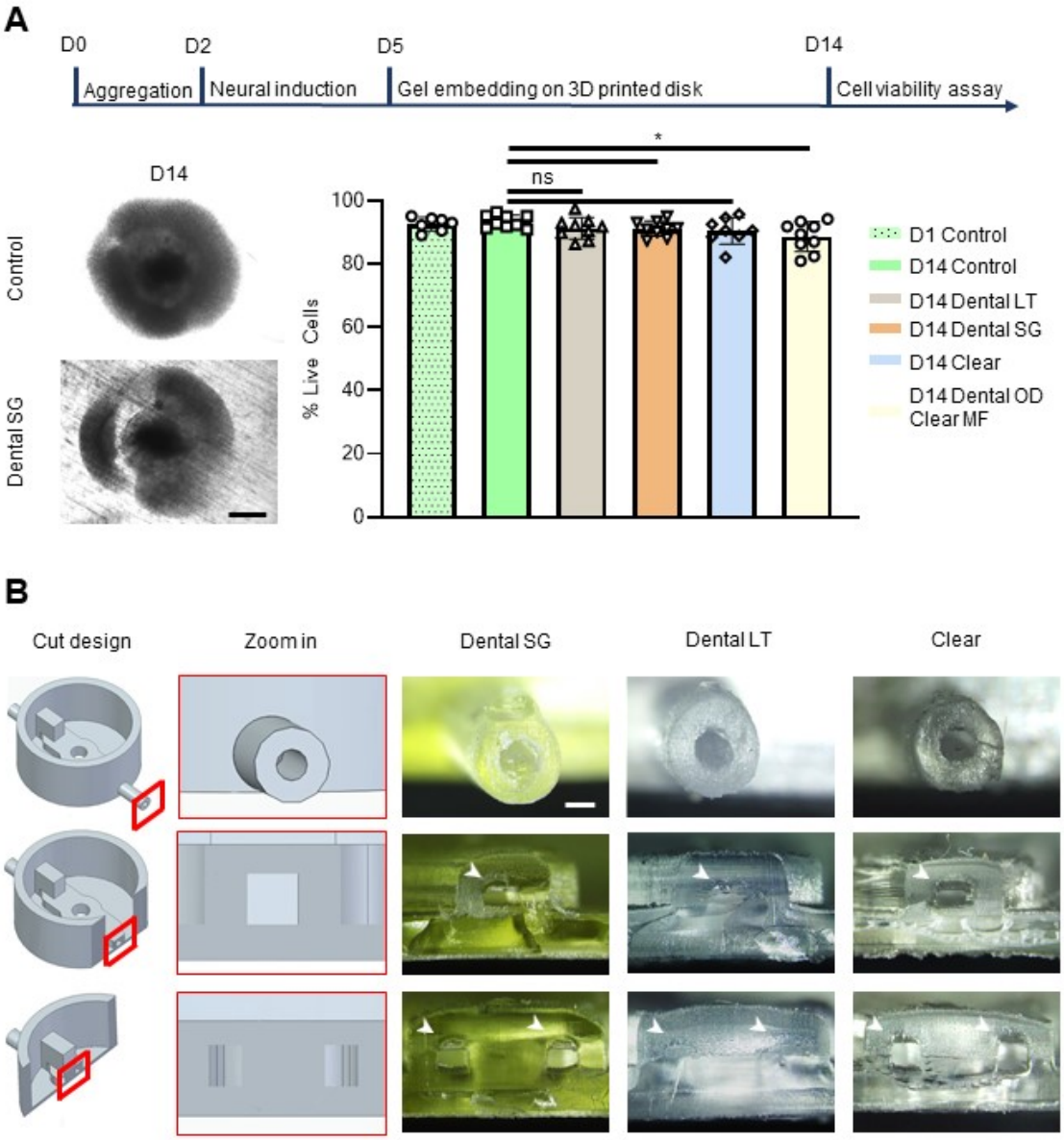
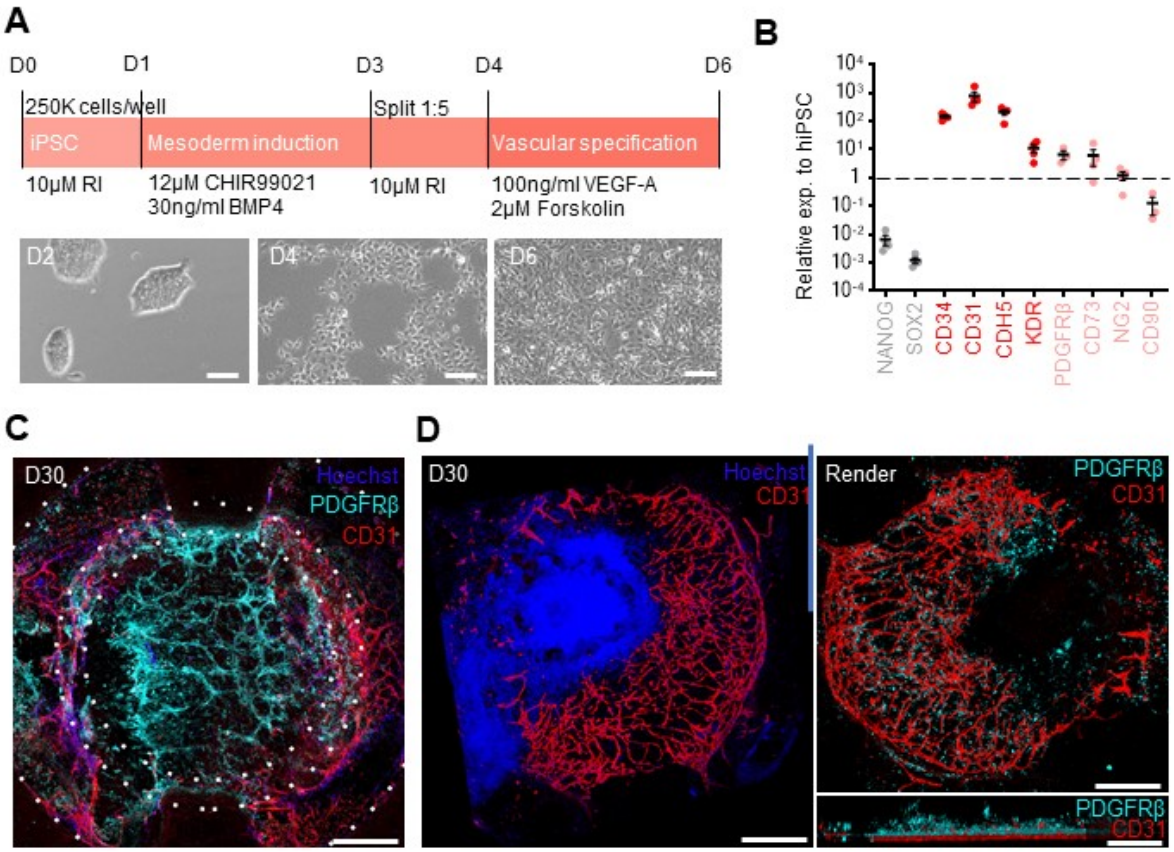
Electronic Supplementary Material (ESI) for Lab on a Chip.

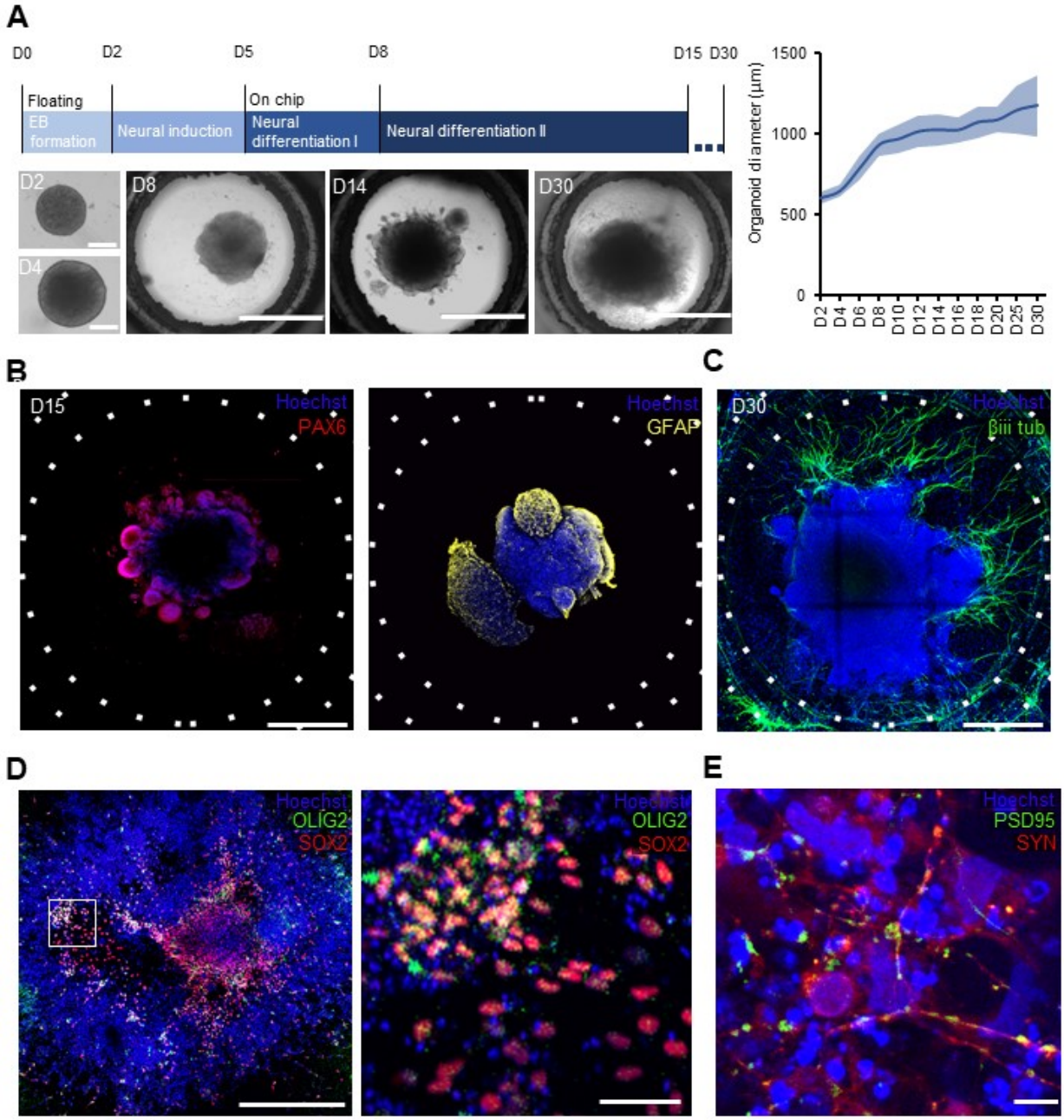
Supplementary Figures



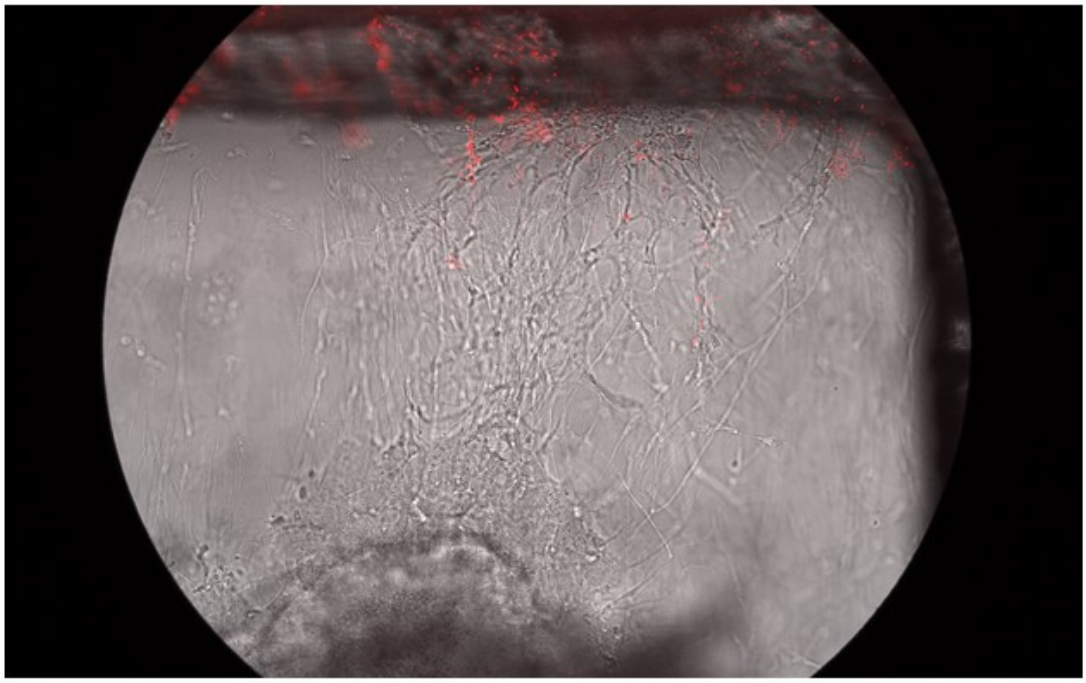
Supplementary Figure 1. Cell viability in organoids grown on cured resins and dimensional stability of 3D printed microfluidic channels (**A**) Brightfield images of organoids at D14 on top of cured Dental SG resin and control with scale 500µm and % of live cells (3 independent differentiations, 9 organoids analyzed per condition) (**B**) Solid edge design of microfluidic chip with cutting planes and corresponding stereo microscope images of 3D printed cut parts printed with Dental SG, Dental LT and Clear resin showing internal microfluidic channels (scale: 500µm). *ns: not significant, LT: long term, SG: surgical guide, OD: ortho dental, MF: monomer free*



Supplementary Figure 2. Directed differentiation of hIPSC into pericytes and endothelial cells (**A**) Vascular differentiation protocol with brightfield images at D2, D4 and D6 during 2D vascular differentiation of hPSC (scale: 100µm). (**B**) Relative expression levels of hPSC, endothelial cell, and pericyte markers from 2D isolated vascular cells prior to microfluidic chip seeding compared to undifferentiated hPSC colonies with GAPDH as housekeeping gene *(n=3; Avg,SEM)* (**C**) IHC of D30 vasculature 75µm from coverslip (scale: 500µm). (**D**) 3D render of D30 neurovascular organoid on chip with CD31+ vascular networks and PDGFRβ+ cells (scale: 500µm).



Supplementary Figure 3. Directed differentiation of hiPSC into cerebral organoids on 3D printed microfluidic chips (**A**) Differentiation protocol for cerebral organoids with brightfield images of aggregated cells at D2 after aggregation and neural aggregate at D4 after aggregation (scale: 250µm) and quantification of cerebral organoid growth seeded at D5 on chip (n=3 independent experiments with 4-6 organoids analysed per n; SD) (**B**) IHC of cerebral organoids on chip stained for PAX6 and GFAP at D15 of differentiation (scale: 500µm). (**C**) IHC of cerebral organoid on chip stained for βiii Tubulin at D30 (scale: 500µm). (D) IHC of cerebral organoid on chip stained for OLIG2 and SOX2 at D30 (scale: 500µm; scale insert 50µm). (E) IHC of cerebral organoid on chip stained for PSD95 and SYN at D30 (scale: 10µm). *: EB: embryoid body, IHC: immunohistochemistry*



Supplementary Video 1. Flowing beads in vascular networks on chip

Gene	Sequence Forward	Sequence Reverse
GAPDH	TCAAGAAGGTGGTGAAGCAGG	ACCAGGAAATGAGCTTGACAA
NANOG	GGCTCTGTTTTGCTATATCCCCTAA	CATTACGATGCAGCAAATACAAGA
SOX2	GAG TGG AAA CTT TTG TCG GAG A	AGC GTG TAC TTA TCC TTC TTC AT
NES	TCA GCT TTC AGG ACC CCA AG	TGG GAG CAA AGA TCC AAG ACG
PAX6	AGG CCC TGG AGA AAG AGT TTG	TTT GGC TGC TAG TCT TTC TCG
TBR1	CGT GTC ATA ATT ATC CCG AAA TCC	CAG ACG TTC ACT TTC CCT GAG
CTIP2	GTT GTG CAA ATG TAG CTG GAA	GAA GAT GAC CAC CTG CTC TC
TUBB3	CCT CCG TGT AGT GAC CCT T	GGC CTT TGG ACA TCT CTT CAG
CD34	CCTCAGTGTCTACTGCTGGTCT	GGAATAGCTCTGGTGGCTTGC
KDR	ACAACCAGACGGACAGTGGT	AGCCTTCAGATGCCACAGA
CDH5	GTTCACGCATCGGTTGTTC	TCTGCATCCACTGCTGTCA
CD31	TGCACTGCAGGTATTGACAA	CTGATCGATTCGCAACGGA
OCLN	ATGGCAAAGTGAATGACAAGCG	CTGTAACGAGGCTGCCTGAAG
CLDN5	GACTCGGTGCTGGCTCTGAG	CGTAGTTCTTCTTGTCGTAGTCGC
PDGFRb	CCC TTA TCATCCTCATCATGC	CCTTCCATCGGATCTCGTAA
CD73	AGTCCACTGGAGAGTTCCTG	TGAGAGGGTCATAACTGGGC
CD90	GAAGGTCCTCTACTTATCCGCC	TGATGCCCTCACACTTGACC
NG2	ACCTTCAACTACAGGGCACAAG	AGGACATTGGTGAGGACAGG

Supplementary Table 1: Real time Quantitative Reverse Transcription PCR (qRT-PCR) primers