

Fig. S1. mRNA expression levels of the endothelial markers calponin1, CDH5, vWF and α -SMA in each sample on day 43. One-way ANOVA analysis, $n=5\sim6$. * $p<0.05$, ** $p<0.01$, *** $p<0.001$; n.s. not significant.

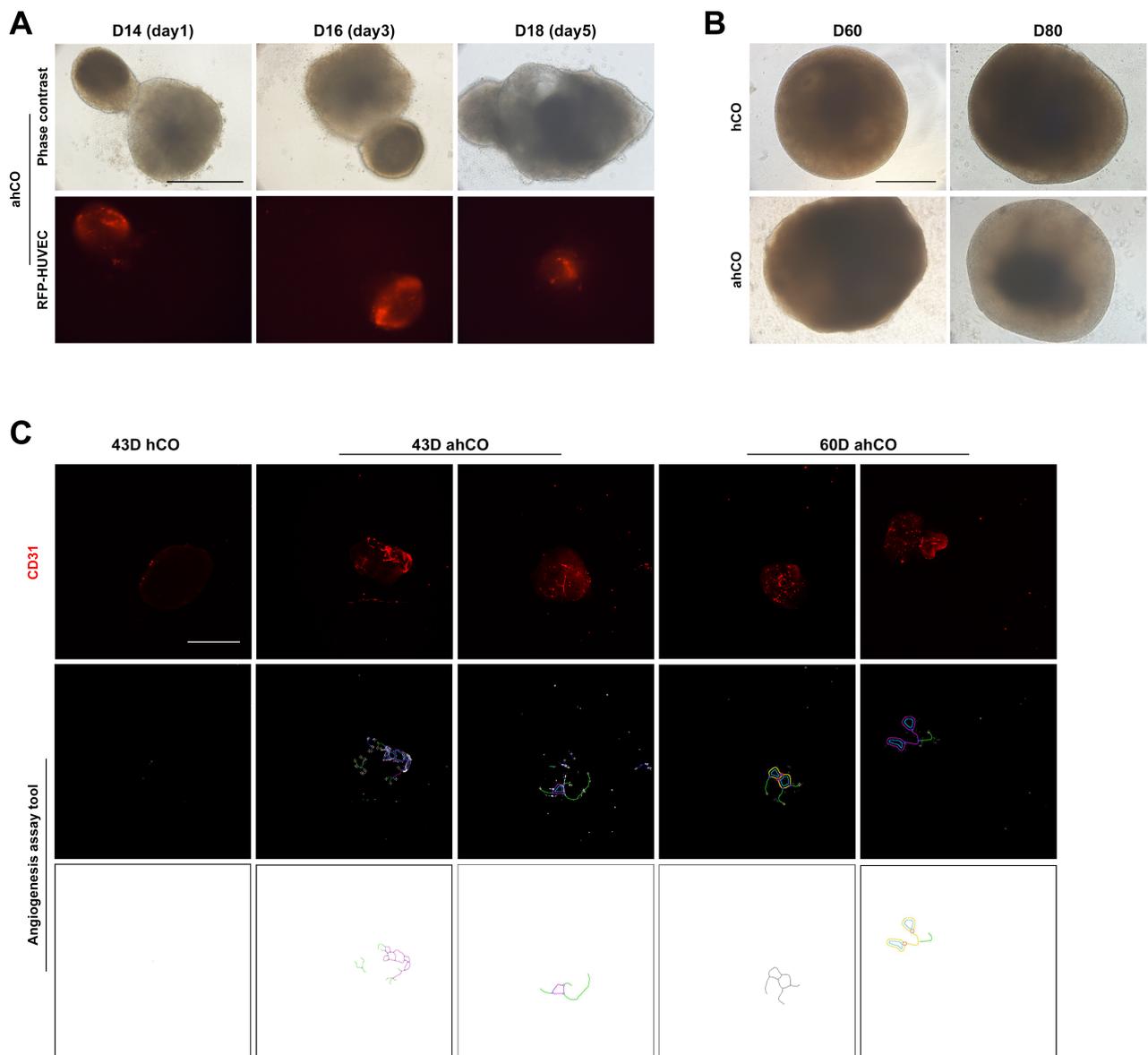


Fig. S2. (A) Organization of vascular was expressed by RFP-expressing HUVECs within organoids (Scale bar: 500 μ m). (B) Both organoids, hCO and ahCO, were maintained during 80 days (Scale bar: 1 mm). (C) AngioTool analysis indicating the abundance of vasculature-like structures within organoids (Scale bar: 1 mm).

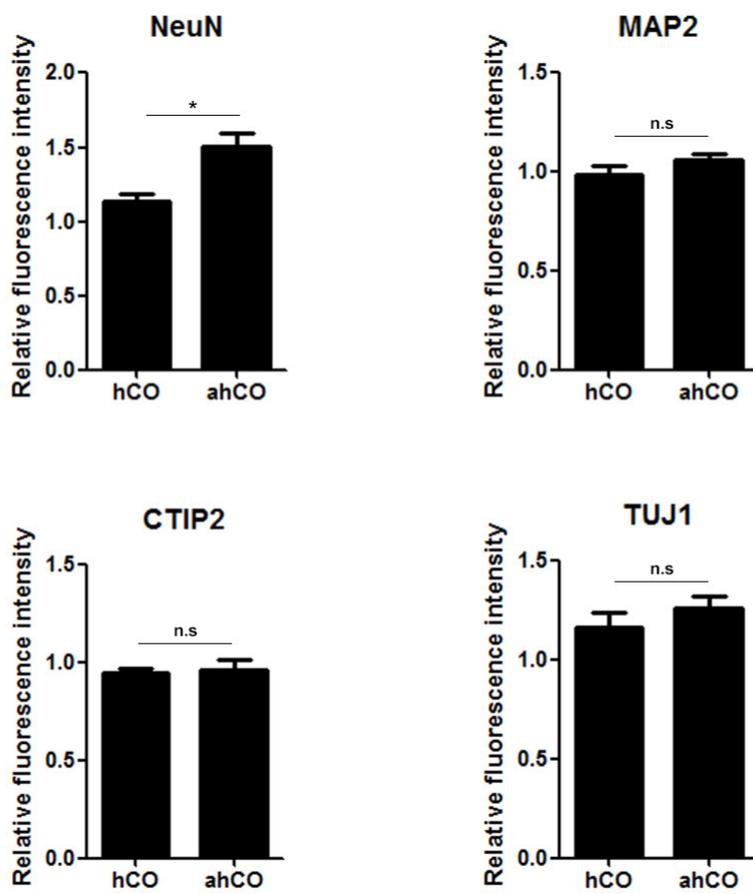


Fig. S3. The neuronal markers staining intensity was quantified in each group. The staining intensity of NeuN was increased by 38.2% in the ahCO groups compared with the control organoid groups. Student's t-test, $n=3$, independent organoids from 2 different batches. * $p<0.05$, n.s. not significant.

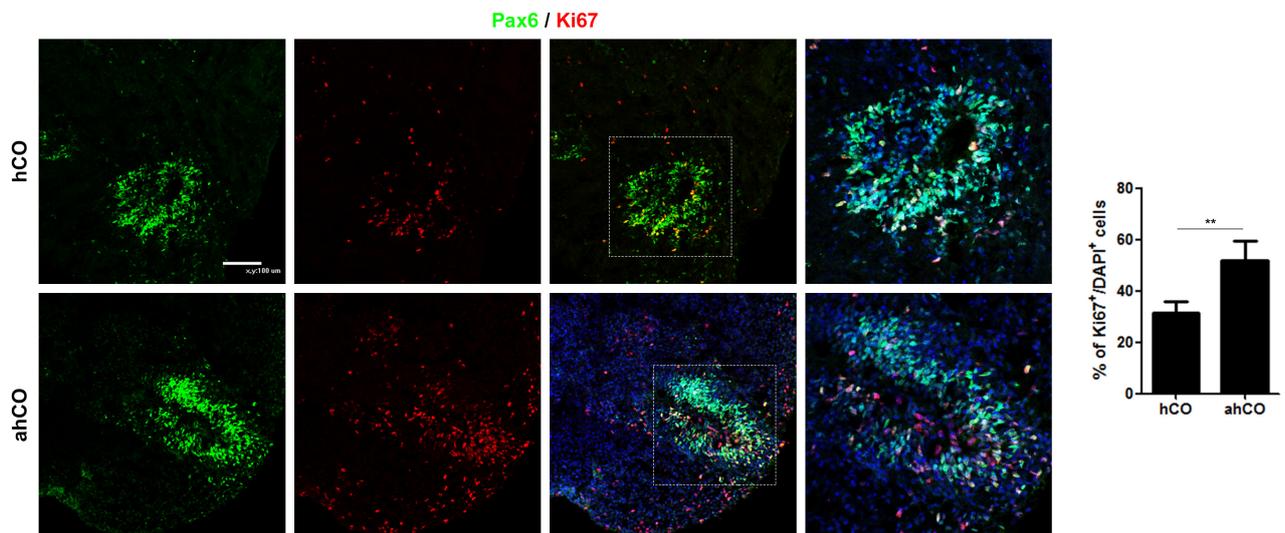


Fig. S4. Cellular proliferation were represented by Ki67 immunostaining and percentage of Ki67+ cells in DAPI+ cells in each group (Scale bar: 100 μ m). Student's t-test, n=3, independent organoids from 2 different batches. **p<0.01.