

Gastruloids Enable Modeling of the Earliest Stages of Human Cardiac and Hepatic Vascularization

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Although model organisms have provided insight into the earliest stages of cardiac and hepatic vascularization, we know very little about this process in humans due to ethical restrictions and the technical difficulty of obtaining embryos during very early development. Here, we demonstrate that micropatterned human pluripotent stem cell-derived gastruloids enable in vitro modeling of the earliest stages of vascularization. We identify a growth factor combination that simultaneously gives rise to cardiac vascularized organoids with a spatially organized and branched vascular network. To demonstrate the broader utility of our vascularization strategy, we use the same vascular-inducing factors to produce hepatic vascularized organoids. Our results suggest that a conserved developmental program generates the vasculature within different types of organs.