

Gastruloids as in vitro models of embryonic blood development with spatial and temporal resolution

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Manuscript Source: <https://www.biorxiv.org/content/10.1101/2021.03.21.436320v1>

Manuscript Authors: Giuliana Rossi, Sonja Giger, Tania Hübscher & Matthias P. Lutolf

Features of the Sentence Audit:

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- Depending on the source of the input text, the Sentence Audit may contain occasional html artefacts that are parsed as sentences (E.g. "Download figure. Open in new tab").
- Always consult the original research paper as the true reference source for the text.

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All queries, feedback or suggestions are also very welcome.

Research Paper Sections:

The sections of the research paper input text parsed in this audit.

[illegible]

The Sentence Audit Of The Research Paper

Title	Gastruloids as in vitro models of embryonic blood development with spatial and temporal resolution
S0 [001]	<p>Abstract</p> <p>Abstract</p>
S0 [002]	<p>Gastruloids are three-dimensional embryonic organoids that reproduce key features of early mammalian development in vitro with unique scalability, accessibility, and spatiotemporal similarity to real embryos.</p> <p>Gastruloids are three-dimensional embryonic organoids that reproduce key features of early mammalian development in vitro with unique scalability, accessibility, and spatiotemporal similarity to real embryos.</p>
S0 [003]	<p>Recently, we adapted gastruloid culture conditions to promote cardiovascular development.</p> <p>Recently, we adapted gastruloid culture conditions to promote cardiovascular development.</p>
S0 [004]	<p>In this work, we extended these conditions to capture features of embryonic blood development through a combination of immunophenotyping, detailed transcriptomics analysis, and identification of blood stem/progenitor cell potency.</p> <p>In this work, we extended these conditions to capture features of embryonic blood development through a combination of immunophenotyping, detailed transcriptomics analysis, and identification of blood stem/progenitor cell potency.</p>
S0 [005]	<p>We uncovered the emergence of blood progenitor and erythroid-like cell populations in late gastruloids and showed the multipotent clonogenic capacity of these cells, both in vitro and after transplantation into irradiated mice.</p> <p>We uncovered the emergence of blood progenitor and erythroid-like cell populations in late gastruloids and showed the multipotent clonogenic capacity of these cells, both in vitro and after transplantation ...</p>

... into irradiated mice.

S0 [006] We also identified the spatial localization near a vessel-like plexus in the anterior of gastruloids with similarities to the emergence of blood stem cells in the embryo.

We also identified the spatial localization near a vessel-like plexus ...
... in the anterior ...
... of gastruloids ...
... with similarities ...
... to the emergence ...
... of blood stem cells ...
... in the embryo.

S0 [007] These results highlight the potential and applicability of gastruloids to the in vitro study of complex processes in embryonic blood development with spatiotemporal fidelity.

These results highlight the potential ...
... and applicability ...
... of gastruloids ...
... to the in vitro study ...
... of complex processes ...
... in embryonic blood development ...
... with spatiotemporal fidelity.

S1 [008] Introduction

S1 [009] Mammalian embryos develop in the uterus and are dependent on maternal interactions, which raises scientific and ethical challenges in accessing them for developmental studies.

Mammalian embryos develop ...
... in the uterus ...
... and are dependent ...
... on maternal interactions, ...
... which raises scientific ...
... and ethical challenges ...
... in accessing them ...
... for developmental studies.

S1 [010] Embryonic organoids are 3D models that are experimental alternatives to mammalian embryos and offer the unprecedented potential to study aspects of embryogenesis in vitro.

Embryonic organoids are 3D models ...
... that are experimental alternatives ...
... to mammalian embryos ...
... and offer the unprecedented potential ...
... to study aspects ...
... of embryogenesis ...
... in vitro.

S1 [011] Due to their accessibility, scalability, and experimental versatility, embryonic organoids offer promising alternatives and complements to studies in animal models (Harrison et al., 2017; Rivron et al., 2018; Rossi et al., 2018; Shao et al., 2017a, 2017b; Sozen et al., 2018; van den Brink et al., 2014; Zheng et al., 2019).

Due ...
... to their accessibility, ...
... scalability, ...
... and experimental versatility, ...
... embryonic organoids offer promising alternatives ...
... and complements ...
... to studies ...
... in animal models ...
... (Harrison et al., 2017; ...
... Rivron et al., 2018; ...
... Rossi et al., 2018; ...
... Shao et al., 2017a, 2017b; ...
... Sozen et al., 2018; ...
... van den Brink et al., 2014; ...
... Zheng et al., 2019).

S1 [012] Gastruloids, a type of embryonic organoid, are aggregates of embryonic stem cells (ESCs) that mimic aspects of post-implantation development, such as symmetry breaking, gastrulation and establishment of the three major body axes, when cultured under the correct conditions (Beccari et al., 2018; van den Brink et al., 2014).

Gastruloids, ...
... a type ...
... of embryonic organoid, ...
... are aggregates ...
... of embryonic stem cells ...
... (ESCs) ...
... that mimic aspects ...
... of post-implantation development, ...
... such as symmetry breaking, ...
... gastrulation ...
... and establishment ...
... of the three major body axes, ...
... when cultured ...
... under the correct conditions ...
... (Beccari et al., 2018; ...
... van den Brink et al., 2014).

S1 [013] We have recently shown that gastruloid culture conditions can be steered to promote early cardiovascular development, or the formation of what resembles a vascular network, and a cardiac primordium (Rossi et al., 2020).

We have recently shown ...
... that gastruloid culture conditions can be steered ...
... to promote early cardiovascular development, ...
... or the formation ...
... of what resembles a vascular network, ...
... and a cardiac primordium ...
... (Rossi et al., 2020).

S1 [014] Cardiovascular development is connected with blood emergence and early blood development depends on the endothelial-to-hematopoietic transition (ETH), a process in which vascular cells of the hemogenic endothelium progressively lose their endothelial signature and activate a hematopoietic transcriptional program (Jaffredo et al., 1998; Ottersbach, 2019; Zovein et al., 2008).

Cardiovascular development is connected ...
... with blood emergence ...
... and early blood development depends ...
... on the endothelial-to-hematopoietic transition ...
... (ETH), ...
... a process ...
... in which vascular cells ...
... of the hemogenic endothelium progressively lose their endothelial signature ...
... and activate a hematopoietic transcriptional program ...
... (Jaffredo et al., 1998; ...
... Ottersbach, 2019; ...
... Zovein et al., 2008).

S1 [015] Hematopoietic system development occurs in two successive, spatially and temporally restricted waves (Costa et al., 2012).

Hematopoietic system development occurs ...
... in two successive, ...
... spatially ...
... and temporally restricted waves ...
... (Costa et al., 2012).

S1 [016] Primitive hematopoiesis begins around embryonic day 7.5 (E7.5) in the yolk sac blood islands, which is defined by the initial wave of blood cell production before circulation is established (Maximow, 1924; Moore and Metcalf, 1970).

Primitive hematopoiesis begins ...
... around embryonic day 7.5 ...
... (E7.5) ...
... in the yolk sac blood islands, ...
... which is defined ...
... by the initial wave ...
... of blood cell production ...
... before circulation is established ...
... (Maximow, 1924; ...
... Moore ...
... and Metcalf, 1970).

S1 [017] After establishment of circulation, definitive hematopoiesis takes place from E8.5 to E10.5 at various embryonic sites: the placenta, the aorta-gonad-mesonephros (AGM) region, and the umbilical and vitelline arteries (de Bruijn et al., 2000; Gekas et al., 2005; Medvinsky and Dzierzak, 1996; Müller et al., 1994).

After establishment ...
... of circulation, ...
... definitive hematopoiesis takes place ...
... from E8.5 ...

End of Sample Audit

This is a truncated Manuscript Microscope Sample Audit.

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