Name	NAOMI MORIS
Position	Group Leader (1st 6)
Year joined *(Crick or founder institute)*	2021

Career History

2008-2011: Imperial College London, UK – BSc (First Class) in Biological Sciences
2012-2013: University of Cambridge, UK – Mres in Genetics
2013–2016: University of Cambridge, UK – PhD in Developmental Biology
2016-2017: Postdoctoral Associate in Department of Genetics, University of Cambridge
2017-2021: Junior Research Fellow at Newnham College, University of Cambridge
2021-present: Group Leader of Stem Cell & Human Development laboratory

Major Awards, Honours and Prizes

2017: Constance Work Junior Research Fellowship
2017: Doctoral Researcher Award Honourable Mention
2016: Cambridge Philosophical Society Award
2016: Florence and David Jacobs Memorial Award
2012: MRC and BBSRC PhD Scholarship awards
2008: Prime Minister's Global Fellowship

Membership of external committees, editorial boards, review panels, SABs etc

Member of the BSDB, ISSCR and SRF.

Lab Name	***Stem Cell & Human Development Laboratory***

Research programme and achievements

We study human embryonic development using three-dimensional (3D) stem cell-based models, so that we can better understand both development and disease.

The development of the embryo starts from a few cells that divide and differentiate, eventually forming all the cell types of your body. It is important that the cells do this in a coordinated way, making the right decisions in the right place and at the right time.

Because of ethical and technical limitations, we cannot study the human embryo at these stages of development, so we know very little about the dynamics of this process in humans.

Our approach is to use human pluripotent stem cells that we grow under defined conditions to create 3D structures that mirror some of the features of early embryos. Using these model systems, we can examine the emergence of the range of cell types and their spatiotemporal coordination, and the organisation into elements of the mammalian body plan.

Using this model system alongside advanced microscopy, molecular and transcriptomics techniques, we aim to address fundamental questions of developmental biology using systems biology approaches. This will allow us to gain an insight into human-specific aspects of development, as well as enabling the establishment of various disease models that will be used to understand the molecular mechanisms underlying birth defects.

Research outputs

Moris, N., Alev, C., Pera, M. & Martinez Arias, A. (2021) *Biomedical and societal impacts of in vitro embryo models of mammalian development*. Stem Cell Reports 16(5):1021-1030. DOI: 10.1016/j.stemcr.2021.03.023
A discussion about the broader implications of embryo-like models of development, particularly human embryo models. We discuss the challenges, limitations and opportunities for biomedical research and therapeutic advances using stem-cell-based model systems such as the gastruloids.

Moris, N.*, Anlas, K.*, van den Brink, S.*, Alemany, A.* et al. (2020) *An in vitro model for anteroposterior organisation during human development*. Nature 582(7812):410-415. DOI: 10.1038/s41586-020-2383-9
The first demonstration of an axially organised human embryo-like model system, the human gastruloids. We showed that the gastruloids break-symmetry, become polarised in their gene expression and undergo morphological axial elongation. They even have a signature of spatial gene expression organisation indicative of early somitogenesis, that would place them at an equivalent stage as a 20-21 day old human embryo.

van den Brink, S., Alemany A., van Batenburg, V., Moris, N. et al. (2020) *Single-cell and spatial transcriptomics reveal somitogenesis in gastruloids*. Nature 582(7812): 405-409. DOI: 10.1038/s41586-020-2024-3
Using spatial transcriptomics and single cell sequencing, we examined the complexity of the mouse gastruloids, including the diversity of cell types. We also showed that embedding these structures in Matrigel was sufficient to generate morphological 'somite-like' structures and anteroposterior organised somites, for the first time.

Beccari, L.* Moris, N.*, et al. (2018) *Multi-axial self-organization properties of mouse embryonic stem cells into gastruloids*. Nature 562, 272–276. DOI: 10.1038/s41586-018-0578-0
Established the similarities between gastruloids and the developing mouse embryo, using temporal transcriptomics datasets and spatial imaging. It was therefore one of the first to show that self-organisation of ES cells, under defined conditions in suspension, can be used to understand post-implantation embryogenesis including colinearity of Hox genes.

Moris, N., Pina C. & Martinez Arias A. (2016) ***Transition states and cell fate decisions in epigenetic landscapes*****. Nature Reviews Genetics. 17 (11):693-703. DOI: 10.1038/nrg.2016.98**

A strong Perspectives piece that challenged an emerging preconception in the field of single-cell transcriptomics, by suggesting discrete transition states in fate decisions using dynamical systems theory.