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Single cells get together: high-resolution approaches to study the dynamics of early mouse development

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Abstract

Embryonic development is a complex and highly dynamic process during which individual cells interact with one another, adopt different identities and organize themselves in three-dimensional space to generate an entire organism. Recent technical developments in genomics and high-resolution quantitative imaging are making it possible to study cellular populations at single-cell resolution and begin to integrate different inputs, for example genetic, physical and chemical factors, that affect cell differentiation over spatial and temporal scales. The preimplantation mouse embryo allows the analysis of cell fate decisions *in vivo* with high spatiotemporal resolution. In this review we highlight how the application of live imaging and single-cell resolution analysis pipelines is providing an unprecedented level of insight on the processes that shape the earliest stages of mammalian development.

Keywords: Systems biology, quantitative high-resolution imaging, genomics, single-cell analysis, mouse embryo, lineage specification.