Seeing how life starts: Imaging the dynamics that pattern the early mammalian embryo

Our goal is to reveal how mammalian cells resolve their fate, shape and position in a living organism. Because fixed specimens cannot capture cell dynamics, we use live imaging technologies to study cells directly within the developing mouse embryo. We established methods to show how transcription factors bind to DNA to control cell fate in single cells of the living embryo. We also discovered that cells extend a new class of filopodia to pull their neighboring cells closer, revealing a mechanism for embryo compaction and polarization. Finally, we uncovered how cells reorganize their actin and microtubule cytoskeletons to drive lineage segregation and create the first forms of tissue organization during development.