TOOLBOX

Human embryo model provides window into early development

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30 SEPTEMBER 2019

A new 3D model of a human embryo reveals the biological processes that unfold in early development[1].

Scientists often study early development using lab-grown embryos, but these are imperfect facsimiles: They are typically 2D or made from animal stem cells.

The new model recapitulates the shape, size and gene-expression patterns of a 10-day-old human embryo. It also mimics ‘symmetry breaking’ — the process by which a ball of identical cells separates into those that eventually form the upper and lower parts of the body.

The researchers used colored fluorescent proteins to tag molecules in human embryonic stem cells destined for different body locations. They then used a gelatinous medium to grow the cells in spherical clumps. They added BMP4, a signaling protein involved in embryonic development, to the dish after two or three days and let the embryos grow for up to 40 hours.

High-speed time-lapse footage shows the uniform clusters of cells dividing into two groups around 20 hours after exposure to BMP4. Cells slated to form the lower part of the body appear on one side and quickly spread across the surface of the hollow sphere of cells. The fact that this occurs in embryos in a dish suggests symmetry breaking happens without a maternal cue or signals from the placenta, the researchers reported in July in *Nature Cell Biology*.

The 3D model may illuminate the molecular processes that drive early human development, the researchers say. It could also be used to study how the placenta affects development.

REFERENCES:

1. Simunovic M. *et al. Nat. Cell Biol.* **21**, 900-910 (2019) **PubMed**