Scientists have developed a 3-D printing method capable of producing highly uniform 'blocks' of embryonic stem cells

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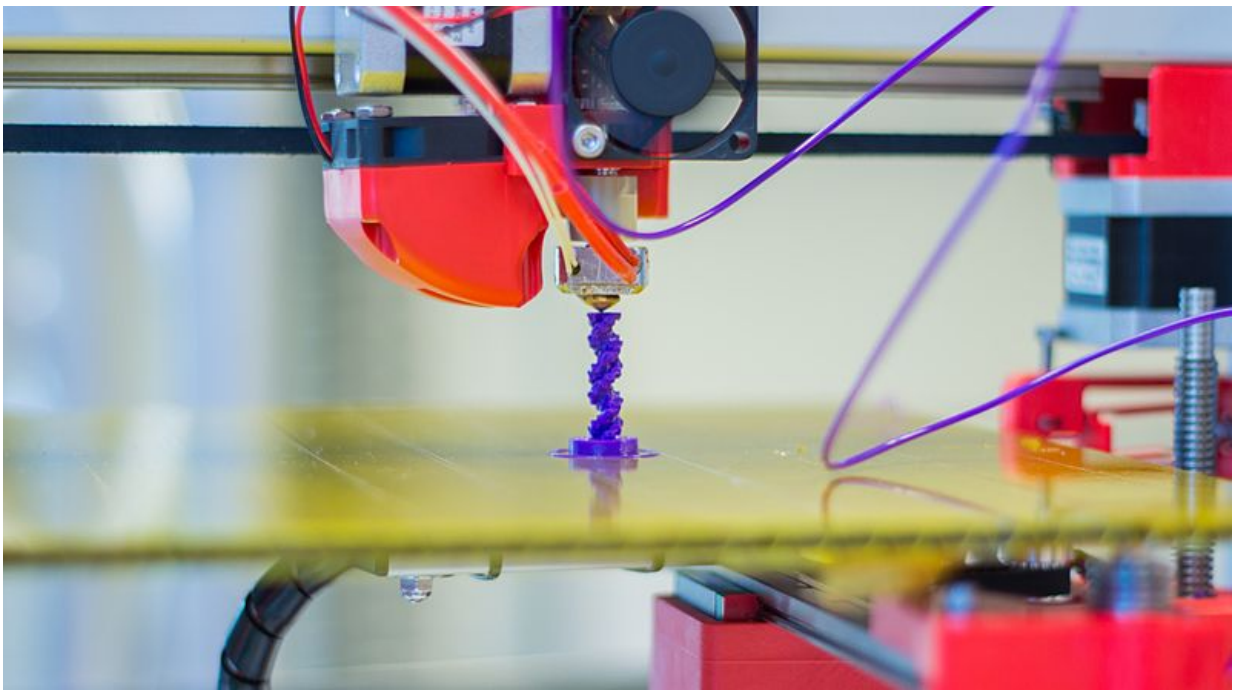

3D printer producing a figure. Credit: Jonathan Juursema via Wikimedia

These cells – capable of generating all cell types in the body – could be used as the 'lego bricks' to build tissue constructs, larger structures of tissues, and potentially even micro-organs.

The results are published today, Wednesday 4th November, in the journal *Biofabrication*.

"It was really exciting to see that we could grow embryoid body in such a controlled manner", explains Wei Sun, a lead author on the paper. "The grown embryoid body is uniform and homogenous, and serves as much better starting point for further tissue growth."

The researchers, based at Tsinghua University, Beijing, China, and Drexel University, Philadelphia, USA, used extrusion-based 3-D printing to produce a grid-like 3-D structure to grow embryoid body that demonstrated cell viability and rapid self-renewal for 7 days while maintaining high pluripotentcy.

"Two other common methods of printing these cells are either two-dimensional (in a petri dish) or via the 'suspension' method (where a 'stalagmite' of cells is built up by material being dropped via gravity.)" continues Wei Sun. "However, these don't show the same cell uniformity and homogenous proliferation."

"I think that we've produced a 3-D microenvironment which much more like that found in vivo for growing embryoid body, which explains the higher levels of cell proliferation."

The researchers hope that this technique can be developed to produce embryoid body at a high-throughput, providing the basic building blocks for other researchers to perform experiments on tissue regeneration and/or for drug screening studies.

"Our next step is to find out more about how we can vary the size of the embryoid body by changing the printing and structural parameters, and how the varying the embryoid body size leads to "manufacture" of different cell types" adds Rui Yao, another author on the paper.

"In the longer term, we'd like to produce controlled heterogeneous embryonic bodies" concludes Rui Yao. "This would promote different cell types developing next to each other – which would lead the way for growing micro-organs from scratch within the lab."

More information: Liliang Ouyang et al. Three-dimensional bioprinting of embryonic stem cells directs highly uniform embryoid body formation, *Biofabrication* (2015). DOI: 10.1088/1758-5090/7/4/044101

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