Scientists urge end to 14-day rule on lab-grown human embryos

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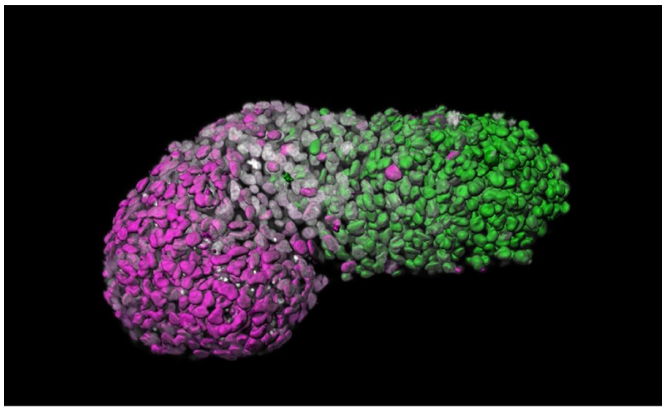

Teams from the University of Cambridge and the Netherlands-based Hubrecht Institute last year reported they had developed a human embryo "blueprint" using human stem cells.

Scientists called Wednesday for a key 14-day time limit for growing human embryos in the lab to be relaxed as they outlined new ethical guidelines for the fast-changing world of stem cell research.

In its first update since 2016, the International Society for Stem Cell Research (ISSCR) said the decades-old rule had little scientific merit, although they stopped short of giving the green light for researchers to breach the time constraint, which is baked into law in some countries.

For years scientists have had to infer the exact changes that human embryos go through in early development.

But new methods of culturing them in a dish—and of creating embryo-like models using stem cells—have enabled scientists to track this process right up to the edge of the two week limit, when the embryos must be destroyed.

It is soon after 14 days that the first signs of the central nervous system appear and the beginnings of tissues are formed.

And scientists think it is during this time that problems occur that cause recurring miscarriages and congenital abnormalities, like those of the heart and spine.

There is increasing recognition of "scientific need and justification for taking it beyond 14 days into this so-called 'black box' period of the next two weeks, where we know very little of what's going on in human embryos," said stem cell and developmental biologist Robin Lovell-Badge, who led the ISSCR update.

"You can also make the ethical argument that given the importance of this period to human development, we have to understand it," said Lovell-Badge, of the Francis Crick Institute in London.

The 14-day rule dates back to the 1980s in Britain, when it was proposed as a way of gaining political approval for research on human embryos by ensuring that there were guardrails.

It is enshrined in law in Britain and certain other countries and has been in ISSCR guidelines for years, meaning that scientists globally abide by the rule.

Lovell-Badge said while the ISSCR was not recommending a new time limit, it has called for public consultation and an ethical framework that could allow longer research on robust scientific grounds.

New 'blastoids'

The ISSCR update covers a wide spectrum of stem cell research, including studies into the implantation of human cells in animal hosts, gene editing and "organoids"—tissue cultures derived from stem cells to replicate organs.

One major development in stem cell science is the production of early-stage human embryo models—made using stem cells derived from tissue, like skin cells.

Two groups of scientists published research in the journal Nature in March that found different ways to produce models of a human blastocyst—the pre-embryonic mass of cells at the stage of development around five days after a sperm fertilises an egg.

These "blastoids" and other simpler embryo-like structures "are not designed in any way to think about reproductive purposes," said Janet Rossant, a professor of Molecular Genetics at the University of Toronto, who was part of the ISSCR guidelines group.

But while these blastoids are not subject to the 14-day rule, the limit means scientists would not be able to verify that what they see in the models after two weeks is what really happens in human development.

"If you can validate them, then you don't need to use the human embryos anymore for that type of experiment," said Lovell-Badge, in a press conference by the Science Media Centre.

He said the last 40 years has seen "very few improvements" in success rates for IVF, while incidence of congenital abnormalities have not substantially improved.

"We've been basing things on animal models and we now know—it's been so obvious over the last five years—that animals and humans are different" in the various molecular pathways mechanisms they use to make particular critical decisions in the early embryo," he said.

"And so we feel that it is necessary to study human cells in the right context."