

# Scientists grow human embryo in a lab without sperm, egg or womb

**Katherine Fidler**

**Scientists report they have grown the early stages of a human embryo-like entity without using sperm, an egg or a womb.**

The 'embryo model' even releases hormones that triggered a positive pregnancy test.

However, the purpose of the embryo is to provide an ethical way of monitoring early human development. Synthetic embryos would not be allowed to progress beyond a matter of weeks.

During the first 14 days after an egg is fertilised by a sperm, the nascent embryo undergoes dramatic changes. It is at this point that myriad developmental disorders and birth defects can arise, but the cause of these is poorly understood.

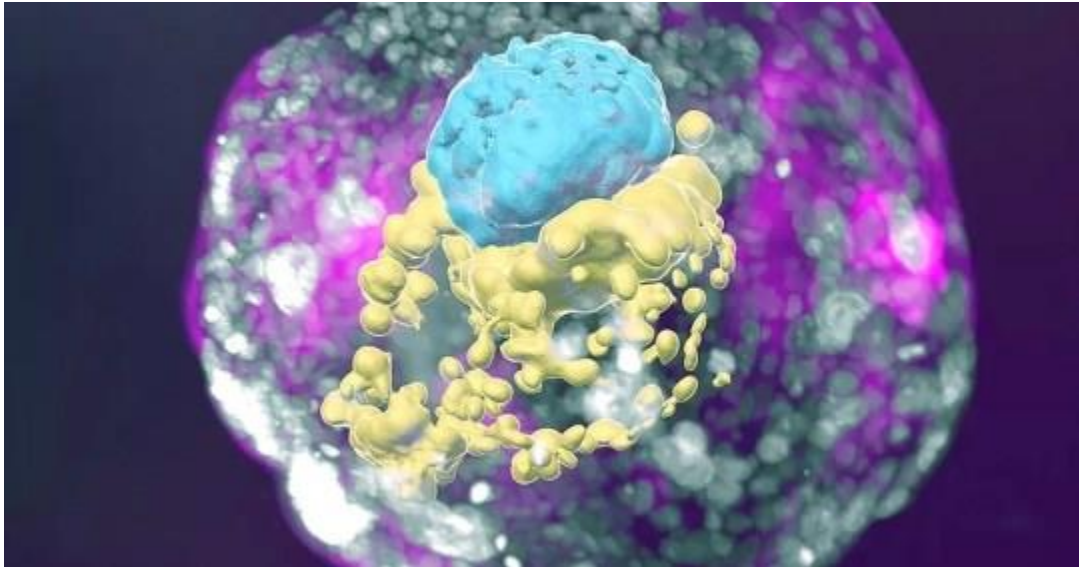


**Scientists study embryos to understand developmental diseases (Picture: Getty)**

The first two weeks are also a major source of miscarriage.

Speaking to the BBC, co-author Professor Jacob Hanna, from the Weizmann Institute of Science, said: 'It's a black box and that's not a cliché – our knowledge is very limited.'

Across the world teams are racing to develop better ways to understand this crucial time. Earlier this year a team from the University of Cambridge and California Institute of Technology [created synthetic embryos using only stem cells](#).



**A model of the human embryo entity (Picture: Weizmann Institute of Science)**

The latest breakthrough, published in the journal Nature, also used stem cells – and the team describes their results as the first 'complete' embryo model, one that mimics key cells and structures throughout the first two weeks of development.

'This is really a textbook image of a human day-14 embryo, [which] hasn't been done before,' said Professor Hanna.

'It closely mimics the development of a real human embryo, particularly the emergence of its exquisitely fine architecture.'

The team used a cocktail of chemicals to 'coax' the stem cells into transforming into four key embryonic cells – epiblasts, trophoblasts, hypoblasts and extraembryonic mesoderm cells.

These were then allowed to grow until reaching a stage equivalent to a two-week old embryo after fertilisation.

'An embryo is self-driven by definition, we don't need to tell it what to do,' said Professor Hanna. 'We must only unleash its internally encoded potential.'

'It's critical to mix in the right kinds of cells at the beginning, which can only be derived from naive stem cells that have no developmental restrictions.'

'Once you do that, the embryo-like model itself says "Go!"'

In many countries, 14 days is the legal cut-off for normal embryo research.

However, these 'embryo models' are not legally seen as embryos and are not governed by the same laws.

The researchers said this approach could help reveal the causes of many birth defects and types of infertility.

It could also lead to new ways of growing transplant organs as well as offer a way around experiments that cannot be performed on live embryos, the team added.

Commenting on the study, Professor Alfonso Martinez Arias, from the department of experimental and health sciences at Pompeu Fabra University, Spain, said he expected the work to raise ethical issues but he added it was 'a most important piece of research'.

He said: 'The work from the Hanna lab just published has, for the first time, achieved a faithful construction of the complete structure from stem cells, in vitro, thus opening the door for studies of the events that lead to the formation of the human body plan.'

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