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What About Synthetic Embryos?

> *"A great deal is at stake in these kinds of synthetic embryo experiments that threaten to manipulate and destroy human life."*

Embryonic stem cells have held out a certain appeal and promise because they are remarkably flexible. Researchers can make various cell types out of them, whether nerve cells or pancreatic islet cells, and these could, in theory, be used to treat diseases like Parkinson's or diabetes. These morally-problematic cells, obtained by destroying human embryos, are, however, limited in their degree of flexibility, lacking the ability to "rewind" and make an entire embryo.

Until now.

Recent reports suggest it may now be possible to generate "synthetic embryos" from embryonic stem cells through various manipulations, including genetic reprogramming steps and mixing various cell types together, without the need for sperm and egg. Researchers claim that synthetic embryos could be used to help them unlock the mysteries of very early human development, and address early pregnancy loss.

When a researcher from Cambridge University and another in Israel recently announced that they had been able to produce such an "embryo model," a longstanding "line in the biological sand" appears to have been crossed, along with some important ethical lines as well.

At least two notable ethical concerns arise in the wake of this new technology: First, the use of unethically-derived cell types in biomedical research, especially human embryonic stem cells, still remains a major concern. Second, if scientists are able to successfully produce a living human embryo by this technology, this would clearly raise additional serious ethical objections.

New human beings are entitled to the respect of entering the world only through the marital embrace. Any time we create living human embryos by other approaches, whether by cloning, by IVF, by synthetic embryo construction, or by other novel methods, we cross a key moral line.

The big question hanging over this research is: Are these so-called "synthetic embryos" really living human embryos? If they are, we have walked right into the ethical landmine of creating human beings solely to be exploited for research or experimental purposes. If they are not, can that line be crossed through additional steps to make them authentic human embryos?

Scientists are likely to continue to improve their techniques

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so as to generate better embryo stand-ins, enabling them to study in ever greater detail the way that early human development unfolds.

As the Director of the Anscombe Bioethics Centre, David Albert Jones, sums it up:

> A synthetic embryo is not a 'model' of an embryo, it is an attempt to make an embryo. If this attempt is successful, scientifically, then it will be wrong ethically, but if it is not successful scientifically then it will not be able to tell us much about normal human development.

The lab from Cambridge concluded that the structures it made were not real embryos. Alfonso Martinez Arias, a developmental biologist at Pompeu Fabra University in Barcelona, Spain agreed, describing them as "masses of cells separated into compartments, but no embryo-like organization." He suggested that the cell manipulation "confuses what [the] cells do" so that a real embryo is not produced.

The research team based at the Weizmann Institute in Israel, however, produced extremely realistic synthetic embryo models that grew for up to two weeks. They exhibited characteristics quite similar to regular embryos, as developmental biologist Jesse Veenvliet of the Max Planck Institute of Molecular Cell Biology and Genetics pointed out: "The similarity to the natural embryo is remarkable, almost uncanny." If it walks like a duck and quacks like a duck then, as they say, might it really be a duck?

Some claim that if synthetic embryos were implanted, they would fail to initiate a pregnancy, and this proves they aren't real embryos. But women's pregnancies sometimes fail through miscarriages not because their child was "not an embryo," but because their child was affected by a genetic or developmental defect.

Could these newly-produced synthetic embryos be real embryos that have a defect thanks to the various laboratory manipulations they have undergone? It seems unsafe to start from the assumption that they are "synthetic" and hence "not-truly-embryos," given the challenging task of distinguishing a "non-embryo" from an "embryo with a defect."

By employing terms like "embryo structures," "synthetic embryos," "stem cell embryo models," or even "stembryos," researchers may be seeking to go around ethics by relying on euphemism.

Even though sperm and egg are not directly employed to make synthetic embryos, this also does not rule out the possibility that these entities could be genuine embryos. In human cloning, for example, no sperm is needed to make real cloned human embryos. Dolly the sheep arose from a real sheep embryo, even though no sperm was involved. Over time scientists are coming up with more technologically advanced ways of creating organisms, including human organisms, apart from the usual approach that relies directly on sperm and egg.

Ethically speaking, a great deal is at stake in these kinds of synthetic embryo experiments that threaten to manipulate and destroy human life. These developmental studies ought to be carried out by studying animal models, carefully avoiding the use of human embryonic stem cells and the production of human embryos.

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