

What Is a SHEEF, and Why Should We Care?

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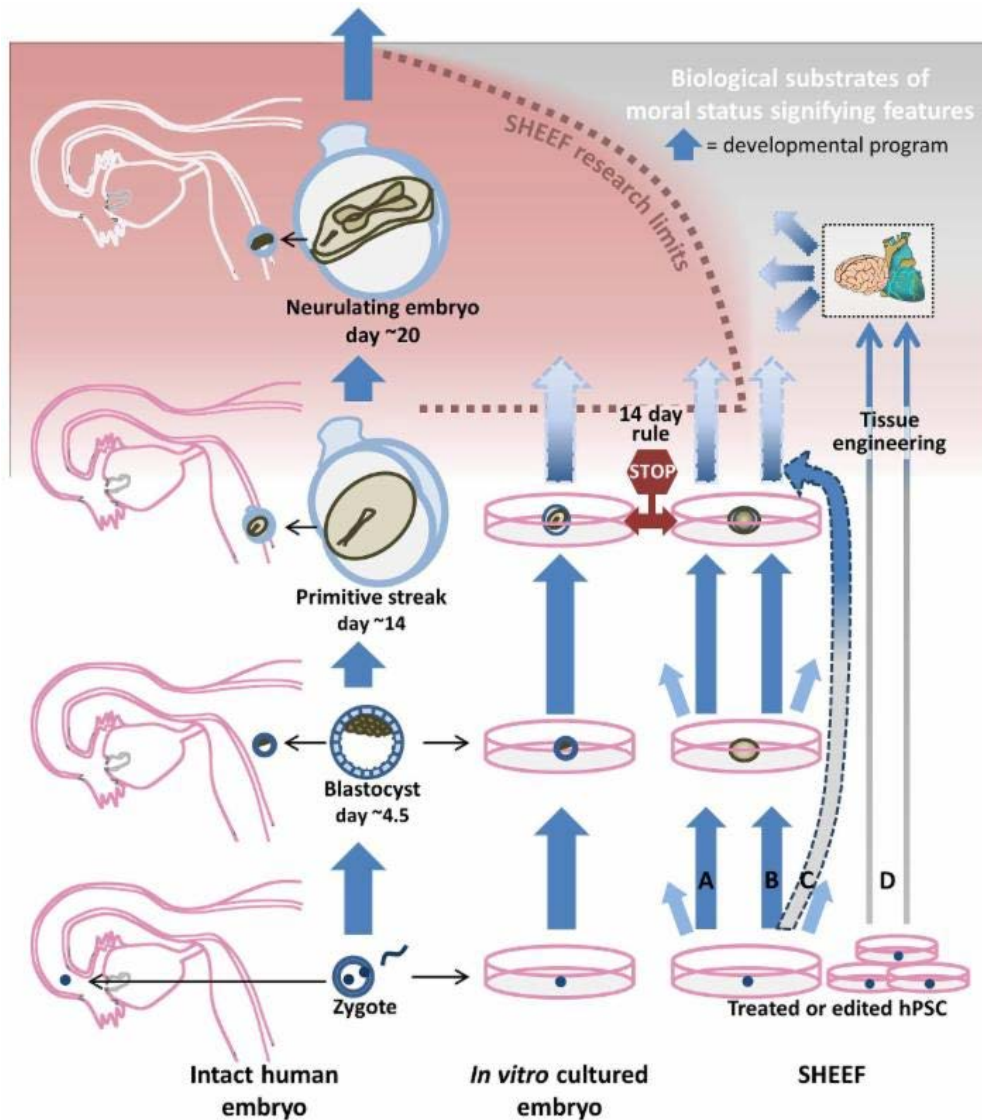
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Human embryo research has long been guided by what is known as the “14-day rule.” That is, various nations have allowed research on embryos up to 14 days post fertilization. The 14-day rule was put in place ostensibly in order to avoid causing pain for the developing embryo. The *primitive streak* — the first visible evidence of gastrulation and the formation of differentiated tissues in the embryo — appears at about day 15 after fertilization.

When the 14-day rule was put in place, laboratories were not able to maintain embryos beyond a few days, so 14 days was an acceptable limit to the decision-makers involved. Recent developments, however, have changed the research landscape, and arguments about changing the 14-day rule are being put forward.

What would happen if you could treat human pluripotent stem cells (hPSCs) in such a way that they developed into an entity that resembled an embryo that is further along than 14 days? Would the 14-day rule apply? Some propose that new rules be developed to cover SHEEFs.

A SHEEF is a “synthetic human entity with embryo-like features.” In the following diagram from the [eLIFE article](#), “Addressing the ethical issues raised by synthetic human entities with embryo-like features,” by Aach, Lunshof, Iyer, and Church, the 14-day rule is shown as a “STOP” sign, and the SHEEFs are shown hopefully as a broken-line outlined arrow bypassing the 14-day rule:



Embryo and SHEEF diagram.

The authors of the study explain under their second point:

The situation can be described figuratively by saying that current guidelines look at development as a single long highway, so that boundaries that address moral concerns can be set by erecting a stop sign at a suitable place. But synthetic biology is now making it possible to construct SHEEFs that may travel 'off-road' or find previously unmapped alternative paths that can carry them around the stop sign into the territories to which the sign was supposed to restrict access. (<https://elifesciences.org/articles/27642>)

In essence, the authors are inviting discussion regarding what legally can be done with SHEEFs based on the differences they may have from embryos formed in utero or in the petri dish of a laboratory. There are some other basic questions that need first to be answered. William P. Cheshire, Jr., M.D., and Nancy L. Jones, Ph.D., raised them in "Can Artificial Techniques Supply Morally Neutral Human Embryos for Research?" in *Ethics & Medicine* 2005; 21(2): 73-88. A few of their questions are summarized below:

1. Once embryos are altered technologically, are they then "morally inert and subject to ownership?"

2. Should science “set as its aim the creation of defective human life” that is intended for destruction?
3. What long-term or unintended effects might classifying “novel versions of nascent human life as nonhuman” have in society? Would we be more likely to classify some others — perhaps those who have not met some particular standard of perfection — as “nonhuman” also?

We do need to have a conversation about SHEEFs and a host of other “scientific” activities. It is a conversation about what it means to be human. Who qualifies as “my neighbor” in the human community? Is it only the scientist in the lab coat, or is my neighbor also the microscopic being in the petri dish?