Gametes? Embryo? Fetus? There are 17 timepoints when a human life might begin. If Roe v Wade falls, what will the states decide?

Now that it appears likely that the Supreme Court will strip away the federal Constitutional right to abortion, the policy responsibility on this volatile issue is poised to be returned to the states. Some states have already indicated they intend to impose an absolute ban even in cases of rape or incest. Others will set a marker measured in weeks, imposing what used to be known as a ‘viability standard’—a highly subjective decision about when during pregnancy when the fetus is conferred state protection. The standard measured in weeks used to be when the fetus could survive outside he womb. It’s likely many new standards will sidestep the viability question completely, setting a time that fits personal or religious views on this highly complex and emotional issue.

The question of ‘when human life begins’ is not an easy question to answer. In this article, GLP contributing senior writer Ricki Lewis, a geneticist by training, addresses the issue. A version of this article first ran in October 2013. An author of several college-level textbooks on human genetics, Dr. Lewis’s intent was to “inform those who confuse embryo with fetus with baby by presenting how biologists describe human prenatal development—beginning at fertilization. Human gestation is on average 38 weeks.

The essay was later reposted by Dr. Lewis in 2017 when the abortion issue popped in the news, and by the GLP in 2021 when the Texas abortion ban was passed.

“Along the way,” Lewis writes, “various right-to-lifers responded to my post with insults to my expertise, but no sign of actually understanding biology.”

Understanding the biology is more important than ever, because the new Texas law is even more draconian than it appears to be at first blush, if that’s even possible. It bans abortion at 6 weeks, but this cutoff is actually 4 weeks after conception when the fetus is 1/25th of an inch. Counting gestation from the last menstrual period is archaic, perhaps a holdover from the days when most obstetricians were male. And as anyone who has ever suspected she is pregnant knows, that reasoning is absurdly wrong. The “morning-after pill” is not a “two-weeks-later” pill. Nonetheless and unfortunately, much of the media have spread the meaningless 6-week factoid.
A biologist’s view of conception and when human life ‘begins’

I’m the author of several college textbooks, on human genetics, human anatomy and physiology, and intro biology. Being a biologist, a textbook author, and a mother, I’ve thought a great deal about the question of when a human life begins. So here are my selections of times at which a biologist might argue a human organism is alive. I’ll save my opinion for the end.

1. *Life is a continuum*. Gametes (sperm and oocyte) link generations.
2. *The germline*. As oocytes and sperm form, their imprints – epigenetic changes from the parents’ genomes – are lifted.
3. *The fertilized ovum*. Of the hundreds of sperm surviving the swim to the oocyte, one jettisons its tail and nuzzles inside the much larger cell, which becomes an ovum. A fertilized ovum = conception.
4. *Pronuclei*. The DNA in these packets from each gamete replicate, and then the pronuclei meet and merge, within 12 hours. The intermingling chromosomes at this first mitotic division form a new human genome. Following that first division, some genes from the new genome are accessed to make proteins, but maternal genetic information, in the form of RNA transcripts, still guides development.
5. *Cleavage divisions ensue*. The components of an 8-celled embryo (day 3) have not yet committed to becoming part of the embryo “proper” (one with layers) or the supportive membranes. A cell from a
cleavage embryo can still develop on its own if teased apart from the whole, yielding identical multiples.

6. **The new genome takes over as maternal transcripts wane (day 5).** Cells continue to divide, bending the structure into a hollow ball of cells. Then a smidgeon of cells, the inner cell mass (icm), separates and lodges on the interior surface. It will become the embryo proper, as the hollow ball contorts into the extra-embryonic membranes.

7. **End of the first week.** The embryo implants in the uterine lining.

8. **Day 16.** The gastrula. Tissue layers form, first the ectoderm and endoderm, then the sandwich filling, the mesoderm. Each layer gives rise to specific body parts.

9. **Day 14.** The primitive streak forms, the first sign of a nervous system and when some nations ban experimenting on human embryos.

10. **Day 18.** The heart beats.

11. **Day 28.** A strip along the back of the embryo, the notochord, closes. Within it the neural tube forms, which gives rise to the spinal cord as the bulge at the top comes to contain the brain. If the tube doesn’t close completely, a neural tube defect (such as anencephaly or spina bifida) results.

12. **End of week 8.** The embryo officially becomes a fetus, all structures present in rudimentary form.

13. **Week 14.** “Quickening,” the flutter a woman feels in her abdomen that will progress to squirms and kicks from within.

14. **Week 21.** A fetus has a (very slim) chance of becoming a premature baby if delivered.

15. **Birth.**

16. **Puberty.** Sexual maturity is the Darwinian definition of what matters to populations and species, when reproduction becomes possible.

17. **Social milestones.** Acceptance into (a) preschool (b) college or (c) medical school; marriage; when grown offspring leave home.

My answer? #14.

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The ability of a fetus to survive outside of a woman’s body sets a practical, if fluid, technological limit on defining when a sustainable human life begins.

Having an active genome, tissue layers, a notochord, a beating heart … none of these matter if the organism cannot survive where humans survive, untethered and breathing oxygen.

Technology has taken us to the ends of the prenatal spectrum, yet not provided too much for the middle, other than fetal surgeries for a handful of conditions. We can collect and select gametes, and even do the same for very early embryos, allowing those without specific diseases to continue development. At the other end, the gestational age at which a premature infant can survive hasn’t crept younger by much over the years.

So until an artificial uterus becomes a practical reality, technology defines, for me, when a human life
begins: at viability outside a woman’s body.

[Note: This article is adapted from a previous piece I posted on my website]

Ricki Lewis has a PhD in genetics and is a science writer and author of several human genetics books. She is an adjunct professor for the Alden March Bioethics Institute at Albany Medical College. Follow her at her website or Twitter @rickilewis