Artificial Wombs

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Background

- Artificial, out of body environment replicating womb-much like an incubator
- Purposed to alleviate premature death, allow same sex and transgender couples to parent biological children, increase successful fetal surgeries by reducing qualifications to be eligible for surgery, safe space to monitor any defects before they become serious
- Potential for future artificial uterus for infertile and transgender women

Scientists in the Netherlands say they are within 10 years of developing an artificial womb that could save the lives of premature babies.

Premature birth, before 37 weeks, is globally the biggest cause of death among newborns.

Artificial wombs would be a sterile, mechanical environment replicating that of a womb. This would serve many purposes, the primary one being alleviation of premature death before 37 weeks. Another purpose, which has received much backlash(in conjunction with efforts to use stem cells to create gametes), is an artificial womb allowing transgender, same sex, or otherwise infertile couples to have their own biological children. In harsh political climates where LGBTQ+ groups in particular are considered immoral and unfit to parent children, the concept of an artificial womb has been poorly received, even though the fact stands that a very small percentage of the population would use an artificial womb for this purpose. The final most common purpose would be to increase the chance of successful fetal surgeries and allowing people to have fetal surgeries in the first place rather than waiting until term. This will increase quality of life for children with birth defects and reduce complications due to being in a closely monitored environment.

History

- First discussed in 1923 in England by J.B.S Haldane
- 1924 Anthony Ludovici wrote that ectogenesis would “destroy” sanctioned gender roles
- In 1925, Dora Russell wrote an essay on social benefits of ectogenesis(pregnancy outside of a woman) for women.
- In 1929, Vera Brittain expressed ethical concerns over lab grown children being selected like stock
- Progress was halted for years as ethical questions were raised

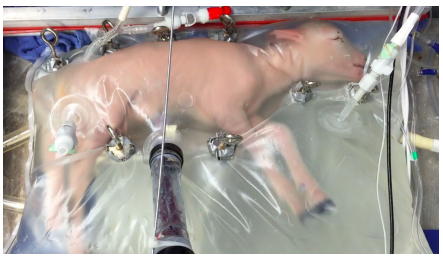
The first extended discussion of artificial wombs was given in a lecture in 1923 by J.B.S. Haldane, an English biologist who was among the first people to propose that an egg could be fertilized outside of the womb.

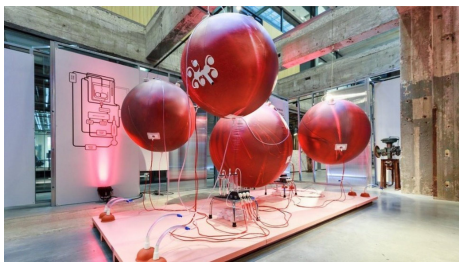
924, a Nietzsche scholar named Anthony Ludovici, who was an outspoken critic of Haldane’s progressive cohort, argued that ectogenesis would corrupt the biologically sanctioned roles that men and women were supposed to play.

In 1929, the English memoirist Vera Brittain wrote an essay suggesting that while ectogenesis might benefit some women, in the wrong hands, it could be misused. In particular, she imagined a genetically stratified future in which “laboratory-grown children… are selected from the best stock.”

History continued

- In the late 80s and 90s, research began to be seriously considered
- In 2017, CHOP kept a lamp alive in an artificial amniotic sac
- In 2019, a very preterm lamb was kept alive in an artificial womb



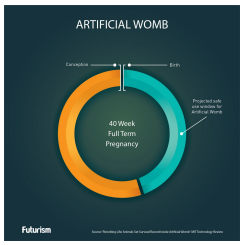


In 2017, a team of researchers at the Children's Hospital of Philadelphia kept a pre-viable lamb fetus alive for four weeks in an amniotic sac, one designed to imitate the womb from which the developing embryo had been prematurely plucked.

In March 2019, a team of researchers from Australia and Japan demonstrated that they could support an extremely preterm lamb, the equivalent of a human baby at 24 weeks, in an artificial environment outside the womb for five days.

Implementation

- Current plan includes beginning clinical trials on humans
- Will impact NICUs to include the devices themselves
- Will impact hospital staff requiring more personnel
- Will impact families with high risk pregnancies especially



The current plan following the successful trials on lambs is to continue advanced testing and then continue to the legal process of approving clinical trials on human beings. This all will impact hospitals, the way they are structured, perhaps even adding a new ward to implement the devices.

Pros

- Easier access to fetal surgery
- Easier monitoring of fetus
- Lower risk of infection for potential preemie babies
- Allow couples with infertility issues to have children easier
- Allow LGBTQ+ couples to have biological children(in conjunction with also new stem cell transplant tech)
- Safe space to develop for longer reduce developmental defects

Extremely premature infants face an uphill battle as they adjust to life outside the uterus, including undeveloped lungs, specific nutritional needs (they can require 30 to 50 percent more calories for growth and development than full-term infants), neurodevelopmental challenges and a constant risk of infection. Artificial wombs would address all of these issues by providing a womb like environment. Increased access to fetal surgery. Allows LGBTQ+ couples to have biological children(in conjunction with stem cell tech also in development).

Ideally, an artificial womb could address all of those complications and more by providing a controlled environment to minimize energy loss and support growth, limiting exposure to bacteria and fungi and minimizing infection risks, Dr. Fritzell said.

Cons

- Some with certain political ideologies do not agree with using this technology to allow LGBTQ+ couples to have children
- Very expensive, could cost upwards of $100,000
- Raises ethical concerns over potential breeding of genetically superior children

Some with certain political ideologies do not agree with the people who could become parents through this. Very expensive-according to endocrine society in early stages it could be upwards of $100,000. Raises ethical concerns-potentially could lead to selective breeding of genetically superior children.

Summary

- Idea has been around since the 1900s
- Trials have been going on since the early 2000s
- Would increase availability of surgeries, reduce risk of infection, etc

Why I Am In Favor

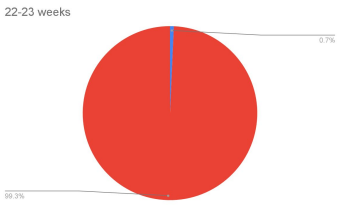
- All humans should have chance to have kids
- Fetal surgery should be accessible. Not a selective process. Fetal surgery changed my brother's life.
- Could help increase preemie babies lifespan and reduce defects, another cause near and dear to me
- So long as laws are put in place, selective child breeding won't take place

I have several primary reasons for being in favor of an artificial womb. For one, I am strongly in support of all humans being able to parent children. Though it is the statistically the smallest reason for artificial wombs, and many view it as an uncomfortable topic, everyone deserves the chance to fulfill their dreams, including LGBTQ+ couples. It hurts no one for them to become loving parents.

My second reason is one that applies personally to me. It is and always has been incredibly important to me that fetal surgery is accessible. My younger brother's quality of life was drastically improved by having an in womb surgery. As a patient of myelomeningocele, his ability to walk and his chiari malformation were fixed by this surgery. He is disabled, but because of this surgery, he does not need to correct his Chiari Malformation, use AFO braces or walkers anymore, and has no need for a shunt. If everyone diagnosed with Spina Bifida or fetal congenital defects could get fetal surgery with less risk to the mother and the baby, so many lives would be improved. Imagining a world where healthcare is easily accessible to all humans and advancements like artificial wombs to improve safety in these high risk surgeries makes me smile. I hope that an

invention like this could one day make it so that fetal surgery is not a selective privilege that is largely luck of the draw as it was for my family, but rather a standard that all children with severe birth defects can receive. Spina bifida kids, and other patients of congenital defects deserve life saving care

Survival of 22-23 Week Preemies



This figure displays the current survival rate of 0.7% for 22-23 week babies delivered premature. With artificial wombs, it is estimated that over 50% of these high risk infants could survive according to Dutch researcher and developers.

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