

**2019 PSBR High School Essay Contest**  
***Finalist***

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When I first asked my mom how me and my twin sister Gabby were created, she had difficulty answering. Not just because of the awkwardness that comes with explaining pregnancy to a five year old, but the fact that she had to explain a scientific procedure I had never heard of before. I was born through in-vitro fertilization (IVF), the process of fertilizing an egg with sperm in a petri dish and then implanting it into the uterus, as opposed to traditional conception. If my mom were to have replied “in-vitro fertilization”, I would have been lost, so she told me in a way that I could conceptualize- baking. Every year my family makes Hamantaschen, a triangle-shaped cookie filled with either fruit or chocolate. My parents made the dough, and then my siblings and I filled and folded the cookies. Very quickly we found it was less messy to place the filling in the middle of the dough before folding. My question came right after we had made hamantaschen, so she replied, “You guys are like our little cookies. We wanted the cookie to turn out perfect so we went to a doctor for help. Just how you guys make sure the filling looks good before you fold Hamantaschen, the doctor helped us make sure you guys were good before placing you into my stomach”. Just like folding a Hamantaschen, reproduction relies on steps in a necessary order. IVF isolates the step of fertilization and creates a controlled environment for fertilization to occur properly before pregnancy can begin.

In-vitro fertilization was pioneered in 1878 by Samuel Schenk. In his experiment, rabbit embryos were extracted from a hole in the rabbit’s abdomen, and fertilized in a culture. Cell divisions were observed, and for the first time in history fertilization had occurred outside of the body. However, Schenk did not implant the embryo back into the rabbit’s uterus, a breakthrough that would take decades of experimentation. Still, his experiment confirmed the possibility of IVF. In 1959, Min Chueh Chang completed the first successful impregnation of an in-vitro fertilized egg. This experiment consisted of black rabbit’s fertilized eggs and sperm implanted in a white carrier. By using different colored rabbits, Chang quelled all doubts about the success of his test. Furthermore, Chang successfully impregnated previously infertile mice. The next decade saw dozens of tests done on mice and rabbits, honing in-vitro techniques. Laparoscopy and hormone therapy were developed, increasing the effectiveness of IVF. The former allows eggs to be extracted through the naval, as opposed to an invasive incision in the abdomen, sometimes leading to the death of the animals. Hormone therapy causes females to release multiple eggs at once, called superovulation, which increases the chances of fertilization occurring outside of the body. As technology became safer and more effective, with successful tests becoming commonplace, scientists now turned their focus to human embryo fertilization.

In-vitro fertilization in humans became a reality in 1968 when Patrick Steptoe and Robert Edwards successfully fertilized a human egg and observed cell division in a petri dish.

Eight years later the pair teamed up with an infertile couple and attempted implanting an in-vitro fertilized egg into a human uterus. Their experiment was successful, and on the 100th anniversary of in-vitro fertilization, a human baby fertilized in a petri dish was born. Since 1978, more than three million babies have born with the help of in-vitro fertilization (National Institute of Health). Hormone therapy is now synced to ultrasounds and blood tests to determine the best time for egg extraction, and laparoscopy has been replaced with an even less invasive needle that enters the ovaries through the vaginal wall. Overall, IVF has become safer and more effective as the technology has advanced.

In-vitro fertilization had its origins in animal testing. Pioneered in rabbits, and improved through countless rabbit and mice tests, animal testing was vital to make sure the process was safe enough for humans to use. Every step of the process from Schenk's 1870 experiment to the first birth was tested on animals before on humans. Animal testing is necessary for biomedical research because it provides ethical, cost-effective tests to prove a technology's worth before it is tested on humans. My siblings and I were born using in-vitro fertilization, after my parents found it difficult to have children. IVF is a life altering technique that makes it easier to reproduce. My life would not be possible without IVF and the extraordinary scientists and animals that advanced it.

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