THE ARSENAL
Augusta University's Undergraduate Research Journal

ISSN 2380-5064 | The Arsenal is published by the Augusta University Libraries | http://guides.augusta.edu/arsenal

Volume 5, Issue 1 (2023)
Special Edition Issue

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Citation
Adaramola, T., & Lee, M. (2023). The ethics of embryo modification. *The Arsenal: The Undergraduate Research Journal of Augusta University, 5*(1), 2-3.
http://doi.org/10.21633/issn.2380.5064/s.2023.05.01.02

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The Ethics of Embryo Modification

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ABSTRACT

With 6 in 10 people worldwide affected by genetic disorders that can range from mild to life-threatening, how to treat or prevent these problems is an important issue. Medical approaches to address these genetic illnesses have proliferated as knowledge and technology have advanced. One of the most effective approaches, embryo modification, is also one of the most controversial. Embryo modification was first introduced to the world at the Second International Summit on Human Genome Editing by He Jiankui who claimed to have performed the technology on twin girls who were in the uterus at the time. Jiankui received a lot of backlash regarding the ethics of the procedure that he conducted, which thrust the embryo modification debate into the spotlight. Embryo modification is the process of genetically engineering the embryo to ensure the presence of removal of certain genes. To carry out this process, embryos are created through standard in vitro fertilization (IVF). After that, preimplantation genetic diagnosis (PGD) is used to screen for healthy embryos. When no healthy embryos are found after screening, embryo modification is then used. Through embryo editing, genetically ill couples can have biological children without risking the possibility of passing those diseases on to their offspring. This procedure offers a way to end the agony of these future children and can increase their life expectancy as well. After extensive research, new methods for modifying embryos have emerged recently, and they can be used to treat genetic abnormalities. For instance, Mitochondrial DNA Replacement Therapy, a form of embryo modification, has been proven in a research study to be a promising treatment for mitochondrial illnesses, despite the fact that there is currently no effective treatment for these conditions. Further research on the implications of embryo modification is necessary to reduce the economic sacrifices families will have to go through to provide treatment for

their children and improve the standard of living for embryos who will become children with genetic diseases. The purpose of this presentation is to introduce three embryo modification technologies: Mitochondrial DNA Replacement Therapy, Engineered Nucleases, and CRISPR-Cas9, and explain how these technologies can be used to treat real-life genetic disorders like Cystic Fibrosis and Duchenne's Muscular Dystrophy.

Received: 02/15/2023 Accepted: 03/29/2023

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