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Critical Reading Assignment #3

I think the use of mitochondrial DNA replacement therapy can be beneficial for families who have a history of or who are at high risk of inheriting a severe mitochondrial disorder. This technique has its ethical concerns but if done safely, it can help save families who are affected in the future. The only common goal after using this therapy is to prevent diseases from being passed down, not modify and enhance.

Mitochondrial replacement therapy works by removing the nuclear DNA from the mother's egg/embryo and inserting it into a donor egg/embryo that has healthy mitochondria. This will allow the egg to inherit the mother's nuclear DNA while not inheriting the mutated mitochondrial DNA. This method is known as spindle transfer, ST, and pronuclear transfer, PNT. The results of these methods are shown to reduce the transfer of mutated mitochondria.

The main ethical concern about mitochondrial DNA replacement is the risk of germline modifications. This means that the changes would pass to future generations. This is not likely because mitochondrial DNA only affects cell energy production and is only responsible for about 0.1% of total DNA. The small percentage would not have any change to physical or personality traits. Another ethical concern is safety. Mixing nuclear DNA from two different individuals can cause genetic incompatibility. When using non-human subjects, there were no development issues when nuclear and mitochondrial DNA were combined. The accidental transfer of mutated mitochondria has stayed below the levels that cause diseases. When this procedure is performed correctly, the potential for health risk is minimal.

Mitochondrial DNA replacement therapy meets ethical standards when used only to prevent diseases that are inherited and when monitored in clinical trials. Safety should always be practiced when performing the procedure for mitochondrial DNA replacement. Families should be fully informed about the risks and benefits of mitochondrial DNA therapy. The procedure could prevent hereditary diseases passed down like diabetes and even heart complications. If the option to prevent life threatening disease is possible, why not make the change. Certain mutations could lead to a life of constant need for medications, doctor visits, and other expensive medical bills that may occur. Some conditions that are affected by mutated mitochondria are not minor and should be taken very seriously.

Work Cited

Mitalipov, S., & Wolf, D. P. (2013). Clinical and ethical implications of mitochondrial gene transfer. *Trends in Endocrinology and Metabolism*, *25*(1), 5–7. https://doi.org/10.1016/j.tem.2013.09.001