Mitochondrial DNA replacement therapy (mtDRT) is a relatively new reproductive technology that allows women with mitochondrial DNA mutations to have children without passing on those mutations. The two main techniques, spindle transfer (ST) and pronuclear transfer (PNT), work by taking the nuclear genetic material from the mother's egg or fertilized embryo and placing it into a donor egg that has had its own nucleus removed, replacing defective mitochondria with healthy donor mitochondria. The resulting child carries DNA from three people, though the mitochondrial donor only contributes about 0.1% of the total DNA. While this sounds like a clear medical win, I believe the therapy should not be widely adopted at this time because the long-term safety risks are too unknown and the ethical implications of germline modification are too serious to overlook.

The biggest issue with mtDRT is that it is a form of germline gene therapy, meaning any changes made are permanent and heritable. This isn't like a drug that wears off; modifications introduced will be passed down through every subsequent generation. Mitalipov and Wolf acknowledge this directly, noting that ST and PNT induce permanent changes to mtDNA that would be transmitted through generations. If something goes wrong, there is no taking it back. The primate studies cited in the paper showed normal development in a small number of animals, but that is far from knowing what happens across a full human lifespan or multiple generations. The HFEA itself concluded that first clinical applications should still be conducted only within formal clinical trials. That is not exactly a ringing endorsement for widespread use.

There is also the ethical issue of consent. The child born from this procedure has no say in being the product of germline modification. If unforeseen health consequences emerge later, that child bears the cost of a decision made before they existed. This differs from a parent consenting to surgery on a sick child, where the child already exists and has an immediate medical need. Here, a permanent change is made to a future person who cannot weigh in. There is also a broader concern worth naming: permitting germline modification even for medical reasons sets a precedent that could normalize the concept and open the door to future nuclear genome modifications beyond disease prevention. Mitalipov and Wolf note that the Nuffield Council recommended wider discussions on germline therapies targeting the nuclear genome, suggesting even supporters recognize that once this line is crossed, it invites harder questions.

Finally, alternatives do exist. Preimplantation genetic diagnosis can screen embryos for mutation load, and donor eggs are available for families wanting to avoid passing on mitochondrial disease. These options are not perfect, but they are established and lower-risk paths that do not involve permanent heritable modifications.

In conclusion, mtDRT has genuine promise but is not ready for widespread adoption. Unproven long-term safety, irreversible germline changes, consent issues, and the risk of normalizing heritable genetic modification all suggest this therapy should remain confined to controlled clinical trials for now.