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Assessing Parental Rights for Children with Genetic Material from Three Parents

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Note

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INTRODUCTION

A healthy baby boy was born on April 6, 2016.[1] Although seemingly ordinary on the surface, this event represents a monumental scientific advancement in that this child signifies the first healthy birth resulting from the genetic material of three different people through the use of a procedure known as mitochondrial replacement therapy.[2] The family adopted this

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1. *See* Jessica Hamzelou, *Exclusive: World's First Baby Born with New "3 Parent" Technique*, NEW SCIENTIST (Sept. 27, 2016), https://www.newscientist.com/article/2107219-exclusive-worlds-first-baby-born-with-new-3-parent-technique/.

2. *See* Maggie Fox, *Baby Born Using 'Three Parent' Technique, Doctors Say*, NBC NEWS (Sept. 28, 2016, 9:41 AM ET), http://www.nbcnews.com/health/health-news/baby-born-using-three-parent-technique-doctors-say-n655701; *see also* Daniel Green, *Three's a Crowd: Identifying the Shifting Parental Rights in Three-Parent Babies*, LAWSCI FORUM (Oct. 3, 2016), https://editions.lib.umn.edu/mjlst/threes-a-crowd-identifying-the-shifting-parental-rights-in-three-parent-babies/. *But see* Charlotte Pritchard, *The Girl with Three Biological Parents*, BBC NEWS (Sept. 1, 2014), http://www.bbc.com/news/magazine-28986843. Children have been born with the mitochondrial DNA of a third individual before, but there are specific differences between the cytoplasmic transfer method used then and mitochondrial replacement therapy in use currently. *Id.* In cytoplasmic transfer, donor mitochondrial DNA is injected into the mother's egg. *See* Paula Amato et al., *Three-Parent In Vitro Fertilization: Gene Replacement for the Prevention of Inherited Mitochondrial Diseases*, 101 FERTILITY & STERILITY 31, 32 (2014). This donor's mitochondrial DNA mixes with the mother's mitochondrial DNA thereby resulting in both the mother's and the donor's DNA being existent in the egg compared with mitochondrial replacement therapy where nearly all the mitochondrial DNA in

procedure to avoid a genetic defect known to cause Leigh syndrome—a disorder which manifests itself in the mitochondrial DNA of the mother's egg and is passed from mother to child through birth.[3] Leigh syndrome can have disastrous effects on the development of organs, especially the brain.[4] This inherited disease resulted in four previous losses of pregnancy for the mother and an additional two deaths of her children after birth: one at the age of six years and one at the age of eight months.[5] In the successful birth, mitochondrial replacement therapy provided a way to avoid the genetic defect by making use of DNA from three different individuals—two women contributed eggs and one man contributed sperm for fertilization of the egg.[6] Aside from being born slightly premature, the child was born healthy thereby assuaging initial concerns that the diseased mother's mitochondrial DNA may replicate faster than the treatment could correct.[7]

A team of fertility specialists from the United States of America and Great Britain completed the treatment in Mexico since the procedure has not been approved in the United States, but this may not be the case for long given its success.[8] If approved in the United States, as may likely be the case in the near future, the use of mitochondrial replacement therapy possesses the potential to alter how courts determine legal parentage since such disputes would lead to the first cases over children who have the genetic material of three separate

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the resulting egg is that of the donor. *Id.* This means that even less of the child's DNA is attributed to the mitochondrial donor. *Id.* Furthermore, this procedure was halted quickly since several of the resultant children suffered from abnormalities that may be attributable to the treatment. *See* Pritchard, *supra* note 2.

3. *See* Fox, *supra* note 2; *see also* Green, *supra* note 2; NAT'L INST. HEALTH, *Leigh Syndrome*, GENETICS HOME REFERENCE, https://ghr.nlm.nih.gov/condition/leigh-syndrome (last visited Jan. 18, 2017).

4. *See* NAT'L INST. HEALTH, *supra* note 3.

5. *See* Hamzelou, *supra* note 1.

6. *See* Fox, *supra* note 2; Green, *supra* note 2.

7. Karen Weintraub, *"3-Parent Baby" Procedure Faces New Hurdle*, SCI. AM. (Nov. 30, 2016), https://www.scientificamerican.com/article/ldquo-three-parent-baby-rdquo-procedure-faces-new-hurdle/.

8. *See* Hamzelou, *supra* note 1 (stating that such success is likely to increase progress around the world); *see, e.g.*, Akshat Rathi, *The World's Second Three-Parent Baby Has Been Conceived Using a Controversial Technique*, QUARTZ (Jan. 18, 2017), https://qz.com/887916/the-worlds-second-three-parent-baby-has-been-conceived-using-a-controversial-pronuclear-transfer-ivf-technique.

individuals. This treatment could lead to a great number of disputes given the likelihood of widespread use due to the frequency of resultant genetic defects from errors in mitochondrial DNA. Given this concern, the legal community should proactively recognize and address the challenges presented by this emerging field as they occur rather than reactively after such inevitable problems arise.

This Note argues that the legal community should adopt a strict rule—similar to the approach taken in organ donation—when resolving disputes of legal parentage involving mitochondrial replacement therapy. This stance would oppose the adoption of the common stances currently taken when assessing parentage in other methods of assisted reproductive therapy. In espousing the outlook of this Note, courts and legislatures should adopt a bright line rule which determines that the individual donating mitochondrial DNA to the resulting child should have no parental rights. The application of this default rule should supersede any other determination of legal parentage made through the application of other approaches. Part I provides a background, explains the science behind mitochondrial replacement therapy, and closes with a brief overview of legal stances taken in organ donation. Part II goes through the different approaches taken in determining legal parentage for assisted reproductive technologies, provides examples in case law, and explains why they should not apply to mitochondrial replacement therapy. Part II further argues that the existing approaches taken in assessing legal parentage in assisted reproductive technologies cannot be transferred to mitochondrial replacement therapy and suggests a bright line rule. Lastly, this Note concludes in Part III that the bright line rule proposed in Part II should be used in evaluating parentage disputes which involve mitochondrial replacement therapy and that doing so will reduce the potential for overall uncertainty in an already inconsistent area of law.

I. BACKGROUND

A. THE SCIENCE BEHIND THREE-PARENT BABIES

Mitochondrial replacement therapy ("MRT") is categorized as an assisted reproductive technology ("ART").[9] Unfortunately, any form of ART, when used, creates a grey area in assessing legal parentage.[10] In such disputes, courts have placed emphasis on the relationships between the possible parent and the child in reaching a resolution.[11] In identifying a child's parents, courts have identified three relevant relationships:

> (1) An 'intended parent' is a parent who intended to bring a child into the world to raise as his or her own; (2) a 'genetic parent' is a person who shares DNA with the child; and (3) the 'biological parent' (also called the 'gestational parent' or 'birth mother') is the woman who gave birth to the child.[12]

Traditionally, children possess genetic material supplied by the sperm and egg of two separate individuals at birth.[13] This would mean that the three separate labels would generally apply to the same two people.[14] ART complicates this by separating such categories.[15] However, even in these disputes, ART leads to

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9. Amato et al., *supra* note 2, at 32; *see also* Amy B. Leiser, Note, *Parentage Disputes in the Age of Mitochondrial Replacement Therapy*, 104 GEO. L.J. 413, 414 (2016); CELLULAR, TISSUE, & GENE THERAPIES ADVISORY COMM., FOOD & DRUG ADMIN., OOCYTE MODIFICATION IN ASSISTED REPRODUCTION FOR THE PREVENTION OF TRANSMISSION OF MITOCHONDRIAL DISEASE OR TREATMENT OF INFERTILITY 11 (2014) [hereinafter FDA BRIEFING DOCUMENT].

10. *See* Leiser, *supra* note 9, at 414.

11. *Id.* at 414–15.

12. *Id.* at 414–15; *see* SUSAN L. CROCKIN & HOWARD W. JONES, JR., LEGAL CONCEPTIONS: THE EVOLVING LAW AND POLICY OF ASSISTED REPRODUCTIVE TECHNOLOGIES 11 (2010) (addressing how the concept of motherhood has changed given the scientific advancements in forms of ART); CHARLES P. KINDREGAN, JR. & MAUREEN MCBRIEN, ASSISTED REPRODUCTIVE TECHNOLOGY: A LAWYERS GUIDE TO EMERGING LAW AND SCIENCE 2 (2d ed. 2011) (discussing the creation of new parental concepts such as the "'intended parent,' 'gestational carrier,' and 'gamete provider'").

13. Lynda Wray Black, *The Birth of a Parent: Defining Parentage for Lenders of Genetic Material*, 92 NEB. L. REV. 799, 812 (2014) (citation omitted) ("Notwithstanding the scientific breakthroughs in reproductive technology and the more inclusive modern understanding of the family unit, every child begins with two (and only two) suppliers of genetic material and one (and only one) gestational carrier.").

14. *See* Leiser, *supra* note 9, at 415–16.

15. *Id.*

a child that is born with genetic material from only two other people.[16]

MRT, on the other hand, leads to children born with genetic material from three different individuals (these children are commonly referred to as "three-parent babies").[17] This technique divides the label of the genetic parent even further than traditional forms of ART in that a single child conceived by MRT may have two legitimate "genetic mothers."[18] This situation results because MRT works by manipulating egg cells prior to fertilization.[19] Egg cells consist of "nuclei with nuclear DNA—the 'instruction manual' for the cell—and many intracellular organelles that carry on the functions of our cells—the 'machinery' of the cell."[20] Mitochondria are one such organelle and are comprised of mitochondrial DNA.[21] MRT, then, is a process which removes the nucleus from one egg and transfers the nucleus into the remnants of a different donated egg (which previously had its nucleus removed and discarded).[22] The resultant egg has a nucleus from one individual (the "nuclear mother") and mitochondrial DNA from a donor (the "mitochondrial mother").[23] The father's sperm then fertilizes the newly assembled egg, and it is implanted in the nuclear mother in order to begin the pregnancy.[24] Because of this process, the resultant child possesses DNA from the father, the nuclear mother, and the mitochondrial mother.[25] However, a comparison of the amount of DNA in a child's cell reveals that the cells

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16. *Id.*

17. *Id.* at 414.

18. *See generally id.* at 416 (stating that MRT challenges traditional views "because children born from MRT have DNA from three different people").

19. There is another variation of conducting MRT involving embryos rather than eggs discussed later, but the process shares the same ultimate result that a child will be born with DNA from three individuals. *See, e.g.*, sources cited *supra* note 9.

20. Leiser, *supra* note 9, at 414 (citing NAT'L INST. HEALTH, *Deoxyribonucleic Acid (DNA)*, NAT'L HUM. GENOME RES. INST., http://www.genome.gov/25520880 (last visited Nov. 28, 2016); NAT'L INST. HEALTH, *What Is a Cell?*, GENETICS HOME REFERENCE, http://ghr.nlm.nih.gov/handbook/basics/cell (last visited Nov. 28, 2016)).

21. Leiser, *supra* note 9, at 414 (citing FDA BRIEFING DOCUMENT, *supra* note 9, at 5).

22. *See* Amato et al., *supra* note 2, at 32; Leiser, *supra* note 9, at 414.

23. Amato et al., *supra* note 2, at 32; Leiser, *supra* note 9, at 414.

24. Amato et al., *supra* note 2, at 32; Leiser, *supra* note 9, at 414.

25. Amato et al., *supra* note 2, at 32; Leiser, *supra* note 9, at 414.

consist of less than 0.001% of mitochondrial DNA thereby making up only 0.1%–0.2% of a person's genes.[26]

Despite the fact that mitochondrial DNA takes up such a small percentage of overall DNA and seemingly has no link to a child's appearance or personality, it is vastly important.[27] Defects in mitochondrial DNA have the potential to create extremely detrimental genetic diseases that are passed down from mother to child.[28] Mitochondrial DNA mutations can cause diseases and defects in many vital organs including the brain, liver, heart, and kidneys, they can affect muscles and the central nervous system, and they "may contribute to the development of common multifactorial disorders such as diabetes mellitus and neurodegenerative disease."[29] Further, mitochondrial DNA in women's eggs also tend to deteriorate as they age thereby increasing risks of disorders developing in both the pregnancy and the resulting child.[30] MRT may have the ability to combat

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26. *See* Leiser, *supra* note 9, at 417 n.17 (citing Robert W. Taylor & Doug M. Turnbull, *Mitochondrial DNA Mutations in Human Disease*, 6 NATURE REVS. GENETICS 389, 391 (2005)) ("MtDNA contains less than 17,000 base pairs and only 37 genes, whereas nuclear DNA contains about 3.3 billion base pairs and 20,000–30,000 genes. *But see* Garry Hamilton, *The Hidden Risks for 'Three-Person' Babies*, 525 NATURE 444, 445 (2015) ('Roughly 1,500 nuclear genes are involved in mitochondrial function, including around 76 that encode proteins which bind to mitochondrially derived peptides.').").

27. Amato et al., *supra* note 2, at 31; Leiser, *supra* note 9, at 417–18. Sperm also contribute mitochondria to the resultant embryo, but they are destroyed soon after fertilization. *See* Peter Sutovsky et al., *Ubiquitin Tag for Sperm Mitochondria*, 402 NATURE 371, 371–72 (1999).

28. Amato et al., *supra* note 2, at 31 (stating that defects in mitochondrial DNA can result in severe chronic diseases).

29. Leiser, *supra* note 9, at 418; *see* Amato et al., *supra* note 2, at 31; *see also* Andrew M. Schaefer et al., *The Epidemiology of Mitochondrial Disorders—Past, Present and Future*, 1659 BIOCHIMICA ET BIOPHYSICA ACTA 115, 115 (2004); Robert W. Taylor & Doug M. Turnbull, *Mitochondrial DNA Mutations in Human Disease*, 6 NATURE REVS. GENETICS 389, 394 (2005).

30. *See* Timothy Wai et al., *The Role of Mitochondrial DNA Copy Number in Mammalian Fertility*, 83 BIOLOGY OF REPROD. 52, 53 (2010); Li-ya Wang et al., *Mitochondrial Functions on Oocytes and Preimplantation Embryos*, 10 J. ZHEJIANG U. SCI. B, 483, 486 (2009) ("Natural human fertility decreases with the maternal age . . . ."); *see also* Leiser, *supra* note 9, at 418 (citations omitted) ("Age-related female infertility is also suspected to be associated with reduced quantity and mutation of mitochondria women's eggs. Egg quality is negatively correlated with maternal age and mitochondrial DNA damage. Therefore, few, low-quality mitochondria in a woman's eggs could contribute to age-related infertility."). *But see* FDA BRIEFING DOCUMENT, *supra* note 9, at 11 ("The quality and quantity of mitochondria in the oocyte might contribute to the developmental competence of the embryo, and mitochondrial factors might be

these as well as other fertility issues in women who wish to conceive at an older age, struggle to conceive at a younger one, or even in such situations where it would normally be considered dangerous for well-being of the mother and the potential child to attempt a pregnancy.[31] As seen in the aforementioned success story, MRT is utilized as a treatment to prevent these genetic diseases.[32]

There are currently two scientific approaches that could consistently lead to successful MRT procedures: spindle transfer and pronuclear transfer.[33] There was also a previous experimental method attempted in the late 1990's that injected healthy mitochondrial DNA into eggs that may have carried flawed mitochondrial DNA, but this research was soon halted by the Food and Drug Administration ("FDA").[34] The FDA blocked

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linked to infertility and reproductive aging. However, there is no consensus on the extent that female infertility can be attributed to oocyte and embryo mitochondrial insufficiency.").

31. *See* FDA BRIEFING DOCUMENT, *supra* note 9, at 11 (stating abnormal mitochondria in the oocyte could be related to infertility and that these various methods might also improve in vitro fertilization (IVF) outcomes for infertile women); Leiser, *supra* note 9, at 420.

32. *See* Amato et al., *supra* note 2, at 32; Hamzelou, *supra* note 1; Leiser, *supra* note 9, at 420.

33. *See* Amato et al., *supra* note 2, at 32–34. Interestingly, it appears that both techniques of producing children are successful as seen in the two case studies, cited earlier in this Note. *Compare* Rathi, *supra* note 8, *with* Hamzelou, *supra* note 1.

34. *See, e.g.*, 42 U.S.C. § 289g(a)(1)–(2) (2012) (stating that research and experimentation on a nonviable living human fetus ex utero or a living human fetus ex utero for whom viability has not been ascertained may not be conducted unless it may enhance the well-being of the fetus or it will pose no added risk of suffering, injury, or death to the fetus); *see* Amato et al., *supra* note 2, at 32–35.

> Although no federal law bans human embryo research in the United States, there are restrictions on funding. . . . [T]he Dickey-Wicker amendment, prohibits the creation of human embryos for research purposes or research in which a human embryo is harmed or destroyed. Several states, such as California and New York, provide funding support for embryonic stem cell research. However, some states, such as California, ban compensation of oocyte donors for research.

Id. at 35; Gina Kolata, *Birth of Baby with Three Parents' DNA Marks Success for Banned Technique*, N.Y. TIMES (Sept. 27, 2016), http://www.nytimes.com/2016/09/28/health/birth-of-3-parent-baby-a-success-for-controversial-procedure.html ("More than a decade ago — before controversy forced the work to stop — researchers tried a simpler technique that did not involve swapping nuclei between eggs. Instead, they injected some healthy mitochondria into an egg in an attempt to help with repeated failures at in vitro fertilization. It was

this third form of research by passing regulations requiring FDA approval for such research through an application process.[35] Congress then followed the FDA's actions with legislation, premised on ethical concerns for the safety of the children potentially resulting from third method, which made it impossible for such research to be funded.[36]

The FDA has not yet approved either spindle or pronuclear transfer, but this may soon change given the recent success stories surrounding MRT.[37] It is likely that the FDA will favor spindle transfer over pronuclear transfer due to the existence of certain ethical concerns.[38] Pronuclear transfer requires the destruction of embryos since the removal of the nucleus takes place after fertilization of the egg, whereas, in spindle transfer, the removal of the nucleus occurs prior to fertilization.[39] Thus, pronuclear transfer requires the destruction of an embryo while spindle transfer does not.[40] Spindle transfer may open a door for the FDA to follow actions taken in other countries, such as the United Kingdom,[41] and allow MRT research and treatment to

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not a method that could be used to prevent the birth of children with mitochondrial diseases.").

35. 42 U.S.C. § 289g(a)(1)–(2); *see* Amato et al., *supra* note 2, at 34–35 (stating that in vitro research using human embryos is controversial; however, one advantage of spindle transfer over pronuclear transfer is that the donor oocytes need not be fertilized, which would avoid the creation and destruction of embryos for the sole purpose of medical treatment).

36. 42 U.S.C. § 289g(a)(1)–(2).

37. *See, e.g.*, 42 U.S.C. § 289g; Amato et al., *supra* note 2, at 34–35; Kolata, *supra* note 34. The spindle transfer technique is more thoroughly researched than the pronuclear transfer technique. Leiser, *supra* note 9, at 421–22. The spindle transfer method was successfully used in 2012 to create human embryos in which all of the mitochondria came from a donor egg. *Id.* The technique has also been demonstrated to work with previously frozen eggs. *Id.* Both techniques must clear significant regulatory hurdles before either can be clinically used. *Id.* The FDA convened in February 2014 to consider the technology's safety. *Id.* Since then, the Institute of Medicine has begun conducting a series of meetings to discuss related ethical and social policy issues, and the British Parliament has voted to allow MRT to be used by specially licensed researchers. *Id.*

38. *See* Amato et al., *supra* note 2, at 32–35; Kolata, *supra* note 34.

39. *See* Amato et al., *supra* note 2, at 32–35; Kolata, *supra* note 34.

40. *See* Amato et al., *supra* note 2, at 32–35; Kolata, *supra* note 34.

41. Michael Le Page, *UK Becomes First Country to Give Go Ahead to Three-Parent Babies*, NEW SCIENTIST (Dec. 15, 2016), https://www.newscientist.com/article/2116407-uk-becomes-first-country-to-give-go-ahead-to-three-parent-babies/ ("[The United Kingdom's] Human Fertilisation and Embryo Authority

take place in the United States.[42] This approach, if approved, would likely gain strong public support given that, as of now, the only way to prevent the transmission of a mitochondrial disorder or disease during pregnancy is through whole egg or embryo donation.[43]

B. CURRENT POSSIBILITIES FOR LEGAL PARENTHOOD OF THREE-PARENT BABIES

1. Legal Principles of Other Assisted Reproductive Technologies

In both whole egg donation and embryo donation the resulting child possesses genetic material from only two people as opposed to the three that results from MRT.[44] Whole egg donation requires an egg donor, similar to the need for an egg donor in MRT, except that no transfer takes place between the birth mother's[45] egg and the egg provided by the donor.[46] After the egg donation, the father's sperm then fertilizes the donated egg, and the resultant embryo is implanted into the birth mother.[47] The child that results then has genetic material of only the father and the egg donor since the mere implantation of an egg in an individual does not add any genetic material to the embryo.[48]

In embryo donation, both egg and sperm donors are recruited for the process and the resultant embryo is, again, implanted in the birth mother.[49] The child that follows has genetic material of only the egg and sperm donors.[50] Meaning

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has given a cautious go-ahead to the use of mitochondrial replacement therapy to prevent mitochondrial disorders, which can be fatal.").

42. *See* Amato et al., *supra* note 2, at 32–35; Kolata, *supra* note 34.

43. *See* Amato et al., *supra* note 2, at 32–35; Leiser, *supra* note 9, at 421.

44. *See* KINDREGAN & MCBRIEN, *supra* note 12, at 105–07; Leiser, *supra* note 9, at 418 ("With whole egg donation, the intending parents use only an egg donor, whereas with embryo donation, the intending parents use both an egg donor and a sperm donor.").

45. Use of the label of birth mother in this instance assumes that surrogacy is not employed.

46. Leiser, *supra* note 9, at 418.

47. KINDREGAN & MCBRIEN, *supra* note 12, at 105.

48. *Id.* at 107.

49. *Id.* The label of birth mother, again, assumes that surrogacy is not employed.

50. *Id.*

that the possibility exists that—if both egg and sperm donors are employed for a single couple—the resulting parents may not share any genetic material with the child.[51] In contrast, the purpose of MRT is to employ only mitochondrial DNA—rather than the entire DNA—from a donor, and an intervening scientific event—MRT—takes place.[52] Despite the distinct differences between these two techniques, it has been proposed that the way the law treats these forms of ART may provide valuable inferences as to how parental rights should be assigned in cases of MRT.[53]

As for ART, it may be suggested that there are four common approaches courts adhere to when resolving disputes where parentage is at issue: the application of state statutes and public policy, basing the decision on the best interests of the child, assigning parentage based on genetic relationship to the child, and assigning parental rights based on the intent of the potential parents.[54] Regardless of what test is relied upon, in resolving parental disputes in ART, court decisions have reflected tendencies to reach the same result as if the intent test had been used, and, because of these similar end results, it has been argued that the intent test would be the best method to adhere to due to its consistency and applicability.[55] However, each of these approaches, including the intent test, should not be applied to parentage disputes involving MRT because the process and nature of MRT reveals similarities to organ donation that render traditional ART approaches inapplicable.

2. Legal Principles of Organ Donation

When assessing the most applicable law in parentage disputes arising from MRT, an understanding of the basic legal

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51. *See* Leiser, *supra* note 9, at 422.

52. *Id.* at 420–22 (explaining that MRT transfers the nuclear DNA of the intending mother into a donor egg with healthy mitochondria, ensuring the resulting child will also have healthy mitochondria).

53. *See generally* Leiser, *supra* note 9, at 422–26.

54. *See* Mary Patricia Byrn & Lisa Giddings, *An Empirical Analysis of the Use of the Intent Test to Determine Parentage in Assisted Reproductive Technology Cases*, 50 HOUS. L. REV. 1295, 1301 (2013). Although Byrn & Giddings set for five different approaches, I merge the state statutes and public policy approaches in this Note because of the interplay that public policy has in the interpretation of state statutes.

55. *Id.* at 1324

principles of organ donation is needed.[56] In organ donation, it is widely accepted that a willing donor loses the property rights in his or her bodily materials at the point that it becomes fully integrated in the recipient.[57] However, the process becomes complicated in determining at what point in the procedure "full integration" occurs for the tissues and organs involved and when the donor loses all property rights in such materials.[58] Given this grey area, courts have ruled that the medical personnel handling donated material are accountable to both the recipient's as well as the donor's wishes.[59] In order to promote clarity, many courts have determined that a donor must make his or her wishes known prior to the abandonment of materials because cells without a designated use are often considered abandoned when removed from an individual.[60] Courts have held firm to this conclusion even if value is later given to the removed bodily materials through sophisticated biotechnological techniques.[61] Because the donor in MRT provides, at the time of donation, a fully functional egg with the understanding that it is to be altered,[62] the conclusions held by these courts provide insight

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56. As there exists a great deal of debate in the area of post-mortem property rights and donation, this Note will simplify the matter by limiting the comparison of the MRT process with *inter vivos* donations from consensual donors.

57. *See* Bernard M. Dickens, *Living Tissue and Organ Donors and Property Law: More on Moore*, 8 J. CONTEMP. HEALTH L. & POL'Y 73, 90 (1992) (citing Venner v. Maryland, 354 A.2d 483, 499 (Md. Ct. Spec. App. 1976) ("[W]hen a person does nothing and says nothing to indicate an intent to assert his right of ownership, possession, or control over such material [as comes from his body], the only rational inference is that he intends to abandon the material.")) (explaining when a person makes clear her intention that the material should be transplanted into a designated recipient, that person asserts a right of ownership and control until the transplantation takes place, and those who control property can lawfully direct not only its use but also its return or deliberate destruction). Thus, "[w]hen couples deposit their gametes for *in vitro* fertilization, they intend exclusive use for themselves and possess the legal power to forbid any other reproductive use." *Id.*

58. *Id.*

59. *See id.*; *see also* Moore v. Regents of the Univ. of Cal., 793 P.2d 479, 502 (Cal. 1990) (Broussard, J., dissenting) ("It is also clear, under traditional common law principles, that this right of a patient to control the future use of his organ is protected by the law of conversion.").

60. *See* Dickens, *supra* note 57, at 86–87. *See generally Moore*, 793 P.2d at 492–93.

61. Dickens, *supra* note 57, at 86–87.

62. *See generally* sources cited *supra* notes 19–25 (explaining the process of MRT).

and clarification as to how parental rights should be assigned if a dispute arises over a child conceived through the use of MRT.[63]

II. ANALYSIS

A. THE INTENT BASED TEST AND WHY IT DOES NOT APPLY TO MRT

As previously discussed, courts appear to have adopted four common methods to assess legal parentage in cases of ART.[64] Although courts and academics seem to champion the intent test,[65] each test possesses its own unique strengths when applied to a dispute involving children conceived through ART,[66] but each method fails in its ability to provide a proper solution to disputes in parentage stemming from MRT.

1. The Application of Existing State Statutes to Matters of MRT

Certain states have crafted statutes in an attempt to proactively address the problem surrounding legal parentage of ART methods.[67] As such, these existing statutes have the potential to extend to MRT matters since MRT is categorized as a form of ART.[68] However, even when applied to legal issues involving traditional ART, the wording and structure of these statutes tend to limit their applicability.[69] Often statutes tend to make use of ambiguous and overgeneralized wording which hinders clear application to matters of ART.[70] Ambiguity in statutes implicitly creates inconsistencies in the application of the law because it allows for courts to interpret statutes in ways often contrary to their intended meaning.[71] The lack of consistency, even in the various forms of traditional ART

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63. *See Moore*, 793 P.2d at 493.

64. *See* Byrn & Giddings, *supra* note 54, at 1301; Leiser *supra* note 9, at 423.

65. *See* Byrn & Giddings, *supra* note 54, at 1324; *see also* Leiser, supra note 9, at 425–26.

66. *See* Byrn & Giddings, *supra* note 54, at 1301–09.

67. *See id.* at 1301–02.

68. *See* Leiser, supra note 9, at 414.

69. *See* Byrn & Giddings, *supra* note 54, at 1301–02; *see also* Leiser, supra note 9, at 424.

70. *See generally* Byrn & Giddings, *supra* note 54, at 1301–02.

71. *See id.* at 1301–04.

disputes, suggests that it may be impractical to apply this approach to the unique scientific processes that constitute MRT.[72]

For example, in Minnesota there exists a statute which states that when, "with the consent of her husband, a wife is inseminated artificially with semen donated by a man not her husband, the husband is treated in law as if he were the biological father of a child thereby conceived," and that "[t]he donor of semen provided to a licensed physician for use in artificial insemination of a married woman other than the donor's wife is treated in law as if he were not the biological father of a child thereby conceived."[73] This statute offers a clear attempt to address the issue of legal parentage in a case of ART before it arises.[74] However, it falls short of addressing how legal parentage may ensue when the couple is unmarried, if the couple makes use of egg donation rather than sperm donation, or, especially important in the matter of this Note, whether such a couple utilizes MRT.[75]

In order to address these shortcomings, states often attempt to circumvent such problems by interpreting statutes broadly before applying them to a situation that can, at times, greatly deviate from their intended meanings.[76] For example, the same Minnesota statute mentioned above has been applied to assess paternity in a situation where an unwed homosexual couple wished to conceive a child through surrogacy—an ART situation that plain language of the statute clearly does not address.[77] In this approach, a court broadened the interpretation of the statute so as to reach an understanding that—despite the use of spousal terms—the statute did not require marriage and, therefore, granted parentage to both the biological father and the woman who served as both egg donor and surrogate.[78] However, the court also applied a narrow construal of the statute

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72. *See* Leiser, *supra* note 9, at 423–24.
73. MINN. STAT. § 257.56 (2016).
74. *See id.*
75. *See id.*
76. *See* Byrn & Giddings, *supra* note 54, at 1303.
77. A.L.S. *ex rel.* J.P. v. E.A.G, No. A10-443, 2010 WL 4181449, at *3 (Minn. Ct. App. Oct. 26, 2010).
78. *See id.*

by declining to attribute parentage to the biological father's same-sex partner.[79]

While this approach seems effective at first glance, different courts can vary drastically in their interpretations.[80] In contrast to the Minnesota court, the Oregon Court of Appeals in *Shineovich v. Shineovich* granted parental rights to a biological mother's same-sex partner through the application of an ART statute similar to that of the previously mentioned Minnesota statute.[81] In acting this way, the Oregon Court of Appeals claimed that the ruling "advances the legislative objective" set forth by the statute.[82]

States have also applied public policy to ART parentage disputes in order to fill in the gaps left by ART statutes.[83] For example, in *Debra H. v. Janice R.*, the New York Court of Appeals recognized parentage by a civil union.[84] This union gave rise to a situation where the biological mother's former partner also possessed maternal rights over the child.[85] However, approaches based on policy alone provide even less guidance than state statues and are, therefore, far too inconsistent between decisions and states so as to provide a solution to disputes arising from the use of MRT.[86] This lack of consistency can be seen even in the established realm of ART by comparing the result of *Debra H. v. Janice R.* with an opinion by the Supreme Judicial Court of Massachusetts stating that "'parenthood by contract' is not the law of Massachusetts and the agreement is unenforceable as against public policy."[87]

These results sum up the main problems with the application of state statutes to MRT: the view is premised on the notion that states have passed relevant ART statutes which possess the opportunity for further interpretation, and, even if

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79. *See id.*

80. *Compare id.*, *with* Shineovich v. Shineovich, 214 P.3d 29, 39–40 (Or. Ct. App. 2009).

81. *See Shineovich*, 214 P.3d at 39–40.

82. *Shineovich*, 214 P.3d at 40 (referring to the legislative objective as offering protection for children).

83. *See* Byrn & Giddings, *supra* note 54, at 1304–06.

84. Debra H. v. Janice R., 930 N.E.2d 184, 196 (N.Y. 2010).

85. *Id.* at 186.

86. *See generally* Byrn & Giddings, *supra* note 54, at 1304–06; Leiser, supra note 9, at 424.

87. *Compare Debra H.*, 930 N.E.2d at 196, *with* T.F. v. B.L., 813 N.E.2d 1244, 1246 (Mass. 2012).

they have, that such statutes can achieve consistent, predictable, and intended results.[88] Unfortunately, these notions are inapplicable to MRT, thereby necessitating the creation of a new applicable rule.

2. Basing the Decision on the Best Interests of the Child

The assignment of legal parentage according to the court's opinion of the best interests of the child tends to foster the most emotional appeal among individuals even though it lacks specificity.[89] *Rubano v. DiCenzo* exemplified this principle when the Rhode Island Supreme Court determined that a biological mother's former same-sex partner also had maternal rights to the child because, contrary to the biological mother's wishes, the partner was deemed a de facto parent.[90] The court wished to act in the child's best interest because the petitioner had an established relationship with the child which had been fostered over a span of years.[91]

Though basing a decision on the best interests of the child appeals to many, it falls short from several standpoints. First, this concept must be approached on a case-by-case basis which removes the likelihood of attaining consistent, predictable, and uniform results. These tenets of law matter because, when present, parties looking to previous results of disputes at the beginning stages of an ART or MRT process can predict disputes and plan for them ahead of time.[92] If parentage rights are assessed on a case-by-case basis parties may not be able to foresee the potential results of the dispute or even what rights they may have in regards to the child at the outset.[93] This encourages litigation over potentially mutual agreement through settlement.[94]

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88. *See generally* Byrn & Giddings, *supra* note 54, at 1304–06.

89. *See* Leiser, *supra* note 9, at 425; *see also* Byrn & Giddings, *supra* note 54, at 1306.

90. Rubano v. DiCenzo, 759 A.2d 959, 975–76 (R.I. 2000).

91. *See id.* at 976.

92. *See* Leiser, *supra* note 9, at 423 ("Variation in the law . . . establishes significant uncertainty for intending parents regarding the protection of their legal parentage rights in the face of changing circumstances, such as divorce or remarriage.").

93. *Id.*

94. *See* Byrn & Giddings, *supra* note 54, at 1296–97 (referencing the result that litigation may be necessary to determine legal parentage).

Second, and most problematic, this approach necessitates an extended evidentiary process in order to determine the subjective best interests of the child. Such assessments could take a significant amount of time subjecting not only the parents, but also the child, to an incredibly stressful and adversarial situation. If such proceedings drag on, the legal dispute itself could become traumatic for a child and result in a paradoxical situation where an approach designed to achieve an outcome best for a child actually creates a situation detrimental to the child's health and well-being. In regards to MRT, a bright line rule would achieve a result in an expedited fashion and may even prevent legal controversies from arising in the first place through increased clarity of the resulting parental rights at the outset of the procedure.

3. Assigning Parental Rights Based on Genetic Relationship to the Child

Approaching the question of legal parentage by focusing on the genetic relationship between the child and the individuals in dispute solves many of the problems faced by the previous methods, particularly those of efficiency and consistency.[95] For example, in Ohio, the decision reached by the court of *Belsito v. Clark* articulated the approach's analysis well when concluding that surrogacy was secondary to genetics in its determination as to which parents had legal rights—providing, ultimately, that the genetic parents had not waived their rights.[96] However, most courts do not favor this approach for ART because it raises new problems in that it may not always result in an outcome best for the well-being of the child due to its lack of policy consideration.[97] For example, it can be easily hypothesized, in terms of ART, that an intended mother and intended father may conceive a child where the intended mother bears the child, but, in doing so, the couple makes use of a donor egg fertilized by the intended father's sperm. In such a situation, even if the egg donor waived her rights and wanted nothing to do with the child, the birth mother would never be considered a legal parent or, at the very least, her parentage would be second to the father's

95. *See, e.g.*, Belsito v. Clark, 644 N.E.2d 760, 763 (Ohio Com. Pleas 1994).

96. *Id.* at 766–67.

97. *See, e.g.*, Pritchard, *supra* note 2 (referencing a child with genetic material from three individuals who, though grateful, wants nothing to do with the mitochondrial donor).

rights since bearing the child would be considered secondary to the genes that the child carries.[98] Evidently, this result could create numerous issues if divorce were ever to ensue.

Admittedly, the above hypothetical would provide less of a problem when it comes to MRT as it would not exclude any of the individuals involved in the process since they each contribute genetic material—the mitochondrial mother would simply be considered an additional third parent unless she had waived her rights. Further, this stance would streamline the process in most situations as the results are clear cut and may be attained concretely through a DNA test.[99] However, this approach is fundamentally flawed in its assumption that, unless waived, the mitochondrial mother should have equal rights to legal parentage just because the child's genetic makeup reflects her DNA—especially since the mitochondrial mother's genetic material makes up a minute fraction of the child's overall DNA.[100]

4. Assigning Parental Rights Based on the Intent of Potential Parents

Regarding ART, legal scholars have championed an intent-based test due to its ability to solve many of the problems inherent in the previous approaches.[101] One of the most historically influential and notable cases, although now superseded by California statute, which based its determination of parentage on intent is *Johnson v. Calvert*.[102] The court in this case, confronted with the issue of gestational surrogacy, stated that "she who intended to procreate the child—that is, she who intended to bring about the birth of a child that she intended to raise as her own—is the natural mother under California law."[103] Since this decision, numerous other courts have

98. *Belsito*, 644 N.E.2d at 767 (describing that there are instances where giving birth is "subordinate and secondary to genetics" when assessing parentage).

99. *Id.* at 766–67 (describing the relative certainty of DNA tests).

100. *See infra* Part II.B.

101. *See generally* Byrn & Giddings, *supra* note 54 (determining that the intent approach is the most common-sense approach when assessing parentage in disputes involving ARTs).

102. *See* CAL. FAM. CODE § 7962 (West 2017). *See generally* Johnson v. Calvert, 851 P.2d 776 (Cal. 1993).

103. *Johnson*, 851 P.2d at 782.

broadened and applied this interpretation[104] to set forth an understanding that "'when a child is conceived via ART, the person(s) that intended to bring the child into the world and raise the child should be the child's legal parent(s)."[105] The Supreme Court of Indiana further exemplified the spread of this approach and its continued use through its decision in *Levin v. Levin* by holding that, despite no genetic link to the child, a man was legally the father of a child after he and the child's mother had divorced.[106] This was due to the court's determination that he had encouraged the artificial insemination and promised to "become the father of the resulting child and to assume his support."[107] Evidently, courts have, without much difficulty, applied the intent test to instances of parentage disputes involving ART.

Furthermore, it has been suggested that the intent test would be the ideal approach to situations involving MRT.[108] A significant aspect of this argument refers to the similarities between gamete donation of some forms of ART and MRT.[109] However, the intent based approach leaves the door open for dispute over ambiguity when seemingly donative actions take place. The issue occurs when lines blur between whether an individual acts as a "true donor" or an "intentional lender of

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104. *See* Byrn & Giddings, *supra* note 54, at 1308 (referencing the following cases: *McDonald v. McDonald*, 608 N.Y.S.2d 477, 480–81 (App. Div. 1994); *Goad v. Arel*, No. FA074025574, 2007 WL 4711515, at *1 (Conn. Super. Ct. May 24, 2007); *Wray v. Samuel*, No. FA074024921, 2007 WL 4711519, at *1 (Conn. Super. Ct. Apr. 20, 2007); *Caliendo v. Mariano*, No. FA074023465S, 2007 WL 4711520, at *1 (Conn. Super. Ct. Jan. 4, 2007); *Caird v. Lugo*, No. FA064017776, 2006 WL 5242383, at *1 (Conn. Super. Ct. Feb. 2, 2006); *DiComo v. Hopkins*, No. FA054007885S, 2005 WL 6007836, at *1 (Conn. Super. Ct. Mar. 7, 2005); *Velardo v. Murray*, No. 485648, 2004 WL 5506691, at *1 (Conn. Super. Ct. Jan. 22, 2004); *Friend v. Lugo*, No. CV020467901, 2002 WL 34370247, at *1 (Conn. Super. Ct. Aug. 20, 2002); *Hatzopoulos v. Murray*, No. FA020460329S, 2002 WL 34370245, at *1 (Conn. Super. Ct. Feb. 15, 2002); *Vogel v. Kirkbride*, No. FA 02-0471850, 2002 WL 34119315, *1 (Conn. Super. Ct. Dec. 18, 2002)).

105. *See* Leiser, *supra* note 9, at 425 (quoting Byrn & Giddings, *supra* note 54, at 1296 and citing Marjorie Maguire Shultz, *Reproductive Technology and Intent-Based Parenthood: An Opportunity for Gender Neutrality*, 1990 WIS. L. REV. 297, 322–25 (1990)).

106. Levin v. Levin, 645 N.E.2d 601, 604–05 (Ind. 1994).

107. *Id.*

108. *See, e.g.*, Leiser, *supra* note 9, at 430–31.

109. *Id.* at 429–31.

procreative genetic material."[110] The intent test suggests that when a dispute arises as to whether an individual intended to become a true donor or an intentional lender of procreative genetic material, the court should focus on the relationship between the parties.[111] However, the focus on the relationship between the parties creates inconsistent and even conflicting results. For example, *K.M. v. E.G.* offers an instance where a same-sex couple agreed to have a child. [112] In this agreement, one provided the egg, and the other bore and gave birth to the child.[113] After the couple broke up, E.G., who gave birth to the child, attempted to argue that K.M. was a true donor.[114] Despite this argument, the California Supreme Court held that because K.M. intended to jointly raise the child with E.G. in their home, K.M's parental rights should be legally recognized.[115] In contrast, in *Leckie & Voorhies* the Oregon Court of Appeals considered a sperm donor to have assumed the role of a true donor to a lesbian couple even though he had multiple interactions with the child.[116] In his role as a true donor, the court ruled that he waived his parental rights.[117]

Another reason mentioned in support of the intent test is that it would easily fall in line with the general approach taken towards ART and, thus, would avoid creating a subsect from the other forms of ART.[118] However, this desire does not justify bending the intent test to fit MRT parentage disputes due to the drastically different processes that occur between ART egg or gamete donation and that of MRT. MRT involves a process that incorporates an intervening event and implicitly makes a true

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110. *See id.* at 428 ("A true donor is someone who contributes his or her gametes to someone else with no intention of parenting the resulting child, whereas an intentional lender of procreative genetic material is someone who contributes his or her gametes for the purpose of having a child whom he or she intends to parent.") (citing Black, *supra* note 13, at 816–17).

111. *Id.* at 429.

112. K.M. v. E.G., 117 P.3d 673, 675–76 (Cal. 2005).

113. *Id.*

114. *Id.* at 677.

115. *Id.* at 682.

116. Leckie & Voorhies, 875 P.2d 521, 522–23 (Or. Ct. App. 1994).

117. *Id.*

118. *See* Byrn & Giddings, *supra* note 54, at 1297 (stating that, in over seventy-four percent of cases where there was a parentage dispute involving ART, the result would have been the same if the courts had applied intent test instead).

donor of the mitochondrial mother each time.[119] Because ART and MRT incorporate different scientific procedures that achieve scientifically different results, MRT necessitates the creation of a separate rule.[120]

B. COURTS AND LEGISLATURES SHOULD ADOPT A RULE THAT THE MITOCHONDRIAL MOTHER HAS NO PARENTAL RIGHTS

MRT necessitates an alternative approach to legal parentage compared to those approaches suggested previously. Courts and legislatures should uniformly adopt a rule that the mitochondrial mother has no claim over a child conceived through the use of MRT. Adoption of a bright line rule makes application easy, simplifies the dispute resolution process, lowers the possibility for disputes to arise, increases efficiency, and does not disrupt the previous approaches to ART.[121] Organ donation should provide the framework for such a rule in that the mitochondrial mother, as a true donor, would have no legal parentage rights, even if considered an intending parent.[122] The science behind MRT procedures, in both its process and outcome, logically leads to the adoption of this stance.[123]

The intent test assumes that the mitochondrial mother has the potential to assume claim to the child. However, unlike egg, sperm, or gamete donation, a constructive process takes place prior to implantation.[124] The resultant egg does not contain the nucleus of the mitochondrial mother's original egg, but, instead,

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119. *See generally* sources cited *supra* notes 19–25 (explaining the process of MRT).

120. *See infra* Part II.B.

121. Britain's Human Fertilisation and Embryology Authority (HFEA) has already adopted such a bright line rule upon legalizing MRT procedures. Ian Sample, *First UK Baby with DNA from Three People Could Be Born Next Year*, THE GUARDIAN, (Dec. 15, 2016), https://www.theguardian.com/science/2016/dec/15/three-parent-embryos-regulator-gives-green-light-to-uk-clinics (determining that the mitochondrial mother has no parental claim on the resulting child).

122. Ideally, states could allow for couples to contract, prior to the procedure, to extend parental rights over the child to the mitochondrial mother. This would eliminate much of the confusion in later determination. However, the great majority of states do not support the theory that parental rights can be assigned by contract alone. *See, e.g.*, T.F. v. B.L., 813 N.E.2d 1244, 1246 (Mass. 2004).

123. *See generally* sources cited *supra* notes 19–26 (explaining the process and result of MRT).

124. *See generally* sources cited *supra* notes 19–25.

that of the nuclear mother.[125] The process to achieve such a result involves intricate scientific procedures and creates what may be argued to be a new egg in that it possesses a different structure and genetic material from a combination of the nuclear and mitochondrial mothers' eggs.[126]

Such an application of medical science parallels the reasoning in *Moore v. Regents of the University of California*.[127] In this case, Moore had certain tissues removed from his body due to surgery.[128] These tissues were then subjected to medical experiments leading to commercial and scientific enterprises.[129] Moore attempted to assert property rights over the researchers' resulting patent by claiming conversion, but the court denied his claim.[130] A primary reason why the court denied his claim was the fact that the experiments yielded a cell line that was both factually and legally distinct from those tissues initially surrendered.[131] Even though such tissues do not provide a perfect analogy to MRT and reproductive substances, it gives insight in that both the cell line and the resultant egg from MRT become distinct from the initial organic substances.[132] The eggs contributed by the mitochondrial mother to MRT, just like Moore's tissues, have the potential to become the final product through the application of an intricate scientific procedure and do not possess such an ability on their own.[133]

Opposition to this stance may set forth counterarguments that such an intervening process could sever the nuclear mother's property rights as well. However, this assertion fails due to the reason as to why the scientific process was done in

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125. *See generally* sources cited *supra* notes 19–25.

126. *See generally* sources cited *supra* notes 19–25.

127. *See* Moore v. Regents of the Univ. of Cal., 793 P.2d 479 (Cal. 1990).

128. *See id.* at 481.

129. *See id.* at 481–82.

130. *See id.* at 497.

131. *See id.* at 492–93 (citing Diamond v. Chakrabarty, 447 U.S. 303, 309–10 (1980)). The court stated that the cell line was both factually and legally distinct from the cells taken from Moore's body. *Id.* Federal law permits the patenting of organisms that represent the product of 'human ingenuity,' but not naturally occurring organisms. 35 U.S.C. § 112 (2012); *see also* Dickens, *supra* note 57, at 77.

132. *Compare Moore*, 793 P.2d at 492–93 (holding that the new cell line was factually distinct from Moore's original cells), *with* sources cited *supra* notes 19–26 (explaining that the mitochondrial donor's egg is stripped of its nucleus and combined with the nuclear mother's nucleus).

133. *See* sources cited *supra* note 132.

Moore which distinguishes itself from the MRT process. In *Moore*, the doctors, as agents of the Regents of the University of California, developed the tissues into a new substance for their own gain.[134] As such, the Regents of the University of California and its doctors reaped the benefits from the procedure.[135] In the context of MRT, the doctors are creating the new egg for the benefit of the nuclear mother, not themselves. Therefore, the nuclear mother reaps the overall benefit since the doctors act on her behalf.

As an additional point, the function of the tissues may be looked at for guidance. In MRT, the nucleus of the nuclear mother's egg receives the fraction of mitochondrial DNA which will help it grow and develop as opposed to the nucleus being given to the mitochondrial DNA.[136] In MRT, doctors destroy the mitochondrial mother's healthy egg that possesses all the potential to function, and take only the mitochondrial DNA. Thus, one cannot logically say that the procedure is done for the benefit of the mitochondrial mother's egg. In essence, the process of MRT appears to assign priority to the nuclear mother because the procedure is undergone for her benefit and that of her egg rather than for the benefit of the doctors handling the procedure, the mitochondrial mother, or the mitochondrial mother's egg.[137]

In addition to the relevance of the decision in *Moore*, the mitochondrial mother becomes further removed from the child when assessing the DNA contributed to the child in detail. For example, proponents of an intent test may argue that the amount of DNA should not guide a determination of parental rights even though the mitochondrial mother adds a virtually negligible amount of DNA to the child—less than 0.001%.[138] However, courts should recognize that this miniscule amount of DNA provides insight into the intent of the mitochondrial mother. Donating a certain fraction of DNA suggests that the

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134. *Moore*, 793 P.2d at 481–82.

135. *Id.* at 481–82.

136. *See* sources cited *supra* note 28 (explaining the effect that healthy mitochondrial DNA has on development as opposed to unhealthy mitochondrial DNA).

137. *See* Dickens, *supra* note 57, at 90 (describing how the medical staff serves the indented recipient while only having a duty to the donor to their use or misuse of the material).

138. *See* Pritchard, *supra* note 2 (demonstrating that a child with DNA from three individuals does not want a relationship with the mitochondrial mother since the amount of DNA is so small).

mitochondrial mother intends to proceed as a true donor because of the difference between the DNA in the nucleus and the DNA in the mitochondria. In MRT, the nucleus of an egg contains the chromosomes contributed to a child whereas the mitochondrial DNA only assists in development.[139] As such, the resulting child from MRT will derive its physical appearance and personality from the nuclear mother and will not bear a resemblance to the mitochondrial mother.[140] This further demonstrates the destruction of the unique aspects of the mitochondrial mother's egg and a severance of connections to the mitochondrial mother.[141]

Opponents of this view may argue that, while the mitochondrial mother contributes only a very little amount of DNA and such DNA does not guide the development of the child's traits, the DNA contributed is no less vital to the development of the child.[142] Therefore, based upon the value of the contribution, the mitochondrial mother should then have a claim to parental rights. While true that the child may not develop naturally without such a donation, this claim is merely based on the assumption, rather than the guarantee. There almost always remains a chance in instances of defects in mitochondrial DNA such as in Leigh Syndrome, regardless of how slim, that the egg in which the nucleus originally came from may develop naturally.[143] Assigning value based on chance is not a firm basis for parentage decisions. Furthermore, a parallel may be drawn to *inter vivos* kidney donation in that the donee ends up containing a small amount of the donor's DNA (located in the donated organ), and the gift may be considered life giving.[144] In *inter vivos* donation, any possession of a donated

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139. *See* Pritchard, *supra* note 2; *see also* Jessie Szalay, *Chromosomes: Definition & Structure*, LIVE SCI. (Feb. 19, 2013, 5:51 PM EST), https://www.livescience.com/27248-chromosomes.html (explaining that chromosomes are located within the nucleus of the cell).

140. Kolata, *supra* note 34 ("The genes for traits that make up a person's appearance and other characteristics are carried in the nuclear DNA. If a white woman got mitochondria from an Asian woman, for example, her babies would be white, with no traces of the Asian mitochondrial donor.").

141. *See* Pritchard, *supra* note 2; *see also* Szalay, *supra* note 139.

142. *See, e.g.*, sources cited *supra* notes 28–31 (listing the detrimental effects that flawed mitochondrial DNA can cause).

143. *See* NAT'L INST. HEALTH, *supra* note 4.

144. *See, e.g.*, sources cited *supra* notes 28–31 (listing the detrimental effects that flawed mitochondrial DNA can cause).

organ or gift is relinquished upon implementation in a new individual.[145] Here, the egg similarly receives what should be considered a donation of vital mitochondrial DNA and intracellular organelles from the mitochondrial mother's egg.[146] Kidney donation helps an individual to function without altering the individual's traits, and, likewise, the mitochondrial mother's act helps the nuclear mother's egg to function properly rather than alter the traits of the egg.[147] In the same way that kidney donors may not leverage their donation to those that possess their kidneys, the mitochondrial mother should not have the opportunity to leverage the donation of her mitochondrial DNA to insert herself as an additional parent.[148]

A rule that the mitochondrial mother has no claim over a child conceived through MRT would reduce litigation in that it requires people to come together prior to the procedure to understand parentage rather than attempting to make a retroactive determination once confusion breeds conflict. Furthermore, even if litigation arises this rule could work easily with the existing precedent and statutes applied to situations involving ART. For example, the possibility exists that the mitochondrial mother, or another individual, could be a surrogate for the resultant egg. In determining the parentage of such a situation, the rule argued by this Note would simply

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145. *E.g.*, Dickens, *supra* note 57, at 90 (determining that a person maintains control over an organ *until the designated transplantation takes place*).

146. *See* sources cited *supra* notes 19–25 (explaining the MRT procedure).

147. *See* Pritchard, *supra* note 2 (stating that the DNA in the nucleus is the DNA that affects physical and mental traits).

148. Although outside the scope of this Note, it is important to specify that the stance of this Note does not suggest that there are any problems with multiparent families. Such familial arrangements are becoming more and more commonplace given the increased use of ARTs. *See* Leiser, *supra* note 9, at 433. However, the adoption of a rule severing a mitochondrial mother's parentage is unlikely to affect multiparent families because MRT should only be used for medical use necessary to prevent potential mitochondrial defects. Although the approval of MRT is foreseeable in the United States, the use of MRT for nonpreventative purposes (for example, if a polyamorous relationship merely wanted to each contribute genetically to a child) is unlikely to follow even if multiparent families wanted each member to contribute to a child. MRT is still experimental and, therefore, the safety of the resulting child is not assured. *See* Pritchard, *supra* note 2 ("The technique itself could allow the child to inherit untried untested medical complications[.]"). Thus, the use of MRT for the destruction of two healthy eggs to create one may cause more harm to a conceived child than simply making use of a single egg.

preempt the intent test in that that the mitochondrial mother would not have claim on the child based solely upon her donation of mitochondrial DNA. After this step, courts could assign parentage by application of a subsequent intent test to ascertain what weight should be given to the action of surrogacy. Even though MRT is a subsect of ART, the utilization of the MRT rule regarding mitochondrial mothers as true donors does not complicate future parentage disputes. In the same way that an individual without any genetic attachment to a child may insert themselves into a relationship with the child through an intent test, so too could a mitochondrial mother. The mitochondrial mother simply would have no additional pull based upon her actions in the MRT process or the donation of mitochondrial DNA.

Lastly, the adoption of this Note's proposed rule combines all the beneficial pieces of each previously mentioned approach: this stance takes the bright line rule concept from state statute application;[149] it incorporates public policy in its development;[150] it takes into account what is best for the child by increasing predictability, thereby lowering future litigation over parentage; the procedure takes a significant amount of time to set up prior to the conception, thereby implying that the parents are committed to the child;[151] it applies a genetic assessment, but it does so while taking into account the type and amount of genes contributed;[152] and it takes into account the implied intent of the parties involved.[153] It also allows for the intent test to be applied to complex situations after MRT parentage disputes are resolved.[154]

CONCLUSION

MRT promises to impact the field of ART. Although it still possesses some ethical and practical concerns,[155] the practice of it now seems medically safe for the first time in history as seen

149. *See supra* Part II.A.1.
150. *See supra* Part II.A.1 .
151. *See supra* Part II.A.2.
152. *See supra* Part II.A.3.
153. *See supra* Part II.A.4.
154. *See supra* Part II.B.
155. *See, e.g.*, Pritchard, *supra* note 2 (stating, among others, concerns over child health, the possibility of playing God, and that the technique may lead to designer children).

by its recent success stories.[156] Because there also exists a form that does not hinge upon the destruction of embryos, the United States will likely follow Britain's example and legalize the use of at least one of its forms in the near future.[157] Depending on the regulations placed on MRT, it may help individuals suffering from mitochondrial diseases and infertility bear healthy children, and, therefore, grow rapidly in popularity.[158] Given this likelihood for increased use, MRT will inevitably follow in the footsteps of other forms of ART and lead to parentage disputes based on the addition of another parent with a genetic influence in the resultant child. As such, the legal community should proactively ready itself for the legal ramifications of such scientific advancements. This Note concludes that MRT clearly distinguishes itself from other forms of ART based on the science behind it, and, therefore, the traditional forms of assigning parentage in disputes involving ART lack applicability to situations utilizing MRT. As such, the legal community must develop a new applicable rule for the subsect MRT.

However, adding the rule for MRT as proposed in this Note, will not affect the determinations already made in other forms of ART. This rule should state that the mitochondrial mother, as a true donor, will have no legal parentage rights and, therefore, cannot levy the contribution of mitochondrial DNA as grounds for parentage. In doing so, the approach will reduce future uncertainty and conflict in an inconsistent area of law.

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156. *See* sources cited *supra* note 8 (referring to the two most recent healthy children born through the use of MRT).

157. *See* Sample, *supra* note 121.

158. *See* sources cited *supra* notes 28–31.