Science & Technology Committee: Mitochondrial Donation

Response by the Wellcome Trust

October 2014

Key Points

- Mitochondrial disease is a devastating and debilitating condition. Most children born with the condition will not make it to adulthood. New IVF techniques (mitochondrial donation) could allow women who carry mitochondrial disease the reproductive option to choose to have their own genetically related children unaffected by these devastating disorders.

- Safety of the techniques is of paramount importance, and has received unprecedented scrutiny through three independent scientific reviews. It is never possible to answer every safety question before medical procedures are used in people for the first time. However, the evidence suggests that mitochondrial donation techniques are sufficiently safe and effective to justify 'first-in-man' clinical use.

- Evidence suggests that any risks of mitochondrial donation are proportionate to the severity of mitochondrial disease; children will continue to be born who will die in infancy if these techniques are not used.

- It is right that Parliament considers the ethics and public interest of new reproductive medical technology, but they do not have the requisite expertise to evaluate the safety and efficacy of these techniques. This responsibility must lie with the regulator - the Human Fertilisation and Embryology Authority (HFEA).

- Government must introduce regulations in the current Parliamentary session to enable mitochondrial donation to progress. This will ensure there is not avoidable delay in patients receiving treatment once the techniques are found to be safe and effective.

Introduction

1. The Wellcome Trust is dedicated to achieving extraordinary and lasting improvements in human and animal health. As a medical research funder it is important to us that the discoveries from the research we support can be translated into the clinic and make a difference to people's lives. We therefore welcome this rapid enquiry, which will provide opportunity for the Committee to further consider the scientific evidence on a pioneering technique that can directly benefit families affected by mitochondrial disease.

2. Medical knowledge in the field of mitochondrial disease is the result of world leading research, which has reached its current advanced stage through support from public and charitable funders. The Wellcome Trust has a long standing interest in the development of the techniques used in mitochondrial donation. It is a key supporter of the Wellcome Trust Centre for Mitochondrial Research based at Newcastle University and led by Professor Doug Turnbull. This is a world leading centre for research and in 2012 received £5.8 million of funding (including £4.4 million from the Wellcome Trust) to continue to develop their work in understanding mitochondrial conditions, developing treatments and possible cures.

Mitochondrial disease and donation

3. Mitochondrial disease is a devastating condition, caused by genetic defects which mean that mitochondria do not work properly or produce enough energy. It often leads to early death or prolonged disabilities for children born with the condition. These children require considerable medical care, significantly impacting their quality of life and that of their families.

4. Mitochondrial donation is a pioneering new IVF technique to prevent the transmission of maternally inherited mitochondrial disease. It allows for unaltered nuclear DNA to be transferred to an egg or embryo that has unaltered healthy mitochondria. Mitochondria are separate from the cell's nucleus, which holds the genetic material that determines our physical and psychological traits, but do contain very small amounts of their own DNA. These techniques therefore only replace, rather than alter, a small number of unhealthy genes in the "battery pack" of the cells with healthy ones.

5. We believe that where mitochondrial donation techniques are shown to be safe and effective, these must be made available to women to give them the choice of having children free of mitochondrial disease. To do otherwise would deny people reproductive choice and the opportunity to prevent the transmission of this devastating disorder.

Safety and scientific review

6. Safety of the techniques is, and will always be, of paramount importance and has received unprecedented scrutiny. On three separate occasions the HFEA's specially convened independent Expert Scientific Review panel examined the safety and efficacy of mitochondrial donation. The panel reported that they found no evidence to suggest that the techniques are unsafe for clinical use, and concluded that both techniques have the potential to be used in patients with mitochondrial disease.

7. Detailed scrutiny of new medical advances is essential and it is right that scientific concerns are raised. This includes objections raised by Dr Morrow regarding mitochondrial-nuclear DNA interactions and Prof Newman in terms of mitochondria functions, which have been explicitly addressed in the evaluation process and have not been found to be a significant concern.

8. It is of course always the case that more research can be done. It is never possible to answer every safety question before new medical procedures are used in people for the first time, and new techniques can always be refined and reviewed. Even the most exhaustive research can establish only that a technique is sufficiently likely to be safe to justify first-in-man clinical use in a research setting. If medicine is to progress, however, clinicians must be permitted to use new techniques when evidence suggests these are sufficiently safe and effective. Medical knowledge in the field of mitochondrial disease and donation has now reached this stage and it is time to progress.

9. It is not possible to be certain that new medical procedures will be 100 per cent safe or effective and these risks must be tensioned with the risk of on-going suffering for families with mitochondrial disease. Scientific evidence suggests that any risks of mitochondrial donation are proportionate to the severity of mitochondrial disease and the well-recognised significant risk that children will continue to be born that will die in infancy if these techniques are not used. Ultimately, it will be up to affected families to judge the balance of these risks with advice from their doctors, and then to decide whether or not they wish to proceed with treatment.

Timely legislation

10. Further research regarding safety and effectiveness must progress, in particular key experiments highlighted by the Expert Scientific Panel. To defer the introduction of regulations until these experiments are complete, however, would lead to a significant delay before patients can be treated. It is important that patients can access treatments as soon as evidence suggests that the technique is safe and effective. And, importantly, first-in-man clinical trials cannot progress without legislative amendments. It is therefore vital that the Parliamentary process required runs concurrently with scientific progress.

11. If Parliament decides that it is ethical and in the public interest to permit regulations, this does not, in itself, open the way for them to be used in clinic, rather it will simply allow the expert regulator to consider the safety and effectiveness of treatment upon application from specialist clinics for its use. It is not appropriate, nor does Parliament have the requisite expertise, to scientifically evaluate and regulate novel reproductive treatments. Assigning these different responsibilities to Parliament and the HFEA is tried and tested method used, for example, in regulating embryo screening.

Public acceptability

12. Extensive public debates and activities, including consultations by the HFEA[1] and discussions led by the Nuffield Council on Bioethics[2], have provided the opportunity for the public to learn about mitochondrial donation and give it impartial consideration. These public engagement activities have repeatedly found that there is broad public support for mitochondrial donation techniques, within a regulatory framework. Opponents who cite an unsupportive public are focusing on polling by ComRes, which is methodologically flawed and misleading[3]. This is particularly disappointing when HFEA and the Government have been exemplary in their balanced public engagement on this important issue.

Conclusion

13. Time is precious for parents at risk of passing on mitochondrial inherited disease to their children. The science and ethics of these techniques have now been extensively debated, and there is broad public support. Evidence suggests that any risks of mitochondrial donation are proportionate to the severity of mitochondrial disease, and robust regulations will allow the HFEA to further evaluate the safety of these techniques. Government must imminently table regulations for debate so that there is no avoidable delay in these life-saving treatments reaching families.

[1] http://www.hfea.gov.uk/6896.html
[2] http://nuffieldbioethics.org/news/2012/discussion-event-novel-techniques-for-the-prevention-of/
[3] Evaluation of the ComRes CARE 3 – Parent Embryo Survey. R. Watermeyer and G. Rowe (Sept, 2014)