# letters

## 2.00005-parent embryos

The media sound-bite of 'Three-parent embryos' is misleading and should not be encouraged by CMF (News Reviews, Spring 2015, p5). Mitochondrial DNA constitutes roughly 0.005% of the total and its 37 genes (~0.15% of the total) are principally concerned with the integrity of the respiratory (energy producing) chain, so the analogy that mitochondrial donation is essentially a case of 'changing the batteries' is a good one.

On average we have 25% of our DNA in common with each grandparent, 12.5% with each great-grandparent, and so on – so we have numerous genetic parents. We also each have ~200 completely novel DNA variants (which occasionally cause very serious genetic disease) that are not present in either biological parent. The CMF promotes the mantra 'unnecessary, unsafe and unethical' in relation to this new technology for preventing devastating and untreatable mitochondrial disease, stating dogmatically that it is 'bad science'. 'Safety' is, of course, absolutely paramount – we can all agree – but is in fact the only serious ethical issue.

Novel approaches to help prevent heart rending experiences and dilemmas common to affected families are undoubtedly necessary if we have any compassion and seek to advance medicine. Concerns about the 'slippery slope' – where it might all lead – are perfectly valid, highlight the responsible use of any new technique, and flag the need for regulation. Unfortunately, as with IVF (which is here to stay), it may be many years before a full assessment of the safety can be completed, together with an evaluation of how such individuals will 'feel' about the treatment.

Alternative legal solutions are indeed available, namely adoption or IVF with egg donation, but these are often unacceptable, and the latter introduces a far greater degree of genetic uncertainty (from the donated gamete) compared to non-mutated mitochondria. In fact, the legal option for many couples is prenatal diagnosis with a view to termination of pregnancy.

The transmission of donated genetic material to the next generation is a novel ethical issue but will occur only through female lineage, and will hopefully provide reproductive confidence in the context of a tragic family history. We are witnesses to the beginning of a very new era of medical science; as Christians we should engage with it and seek to steer a safe passage through rather than condemn and dismiss potentially beneficial developments.

***Peter Turnpenny*** *and* ***Alan Fryer***
*Consultant Clinical Geneticists in Exeter and Liverpool*

## Author's reply

My 400 word News Review[1] in the Spring 2015 edition of *Triple Helix* could not possibly do justice to the detail in the articles[2,3] and official submissions[4,5,6,7,8,9] that CMF has published on the subject of 'therapeutic mitochondrial donation' over the past five years. However, even allowing for the simplification inevitably inherent in summarising, I consider that the description of 'unnecessary, unsafe and unethical' fits these therapies well.

The astronomer Johannes Kepler described science as 'thinking God's thoughts after him'. If fallen human beings are 'flawed masterpieces', as Professor John Wyatt has argued, then the best science and technology is that which aims to restore the human masterpiece in accordance with the artist's original intention rather that attempting to design something new. We are certainly not opposed to beneficial scientific advances but there is a difference between faithful restoration on the one hand and 'enhancement' on the other.

The technologies in question, *pronuclear transfer* (PNT) and *maternal spindle transfer* (MST), do not involve simply the delicate and precise extraction and replacement of mitochondria containing diseased DNA – 'replacement of batteries' is a specious euphemism for what really is happening.

The whole nucleus is rather extracted and replaced with another, either before (MST) or after (PNT) fertilisation. Or, to put it another way, the entire cytoplasm along with its mitochondria and all other organelles is stripped from its nuclear connections and combined with another nucleus – more Picasso than Michelangelo.

Aside from the fact that any new genetic defects thus created will be passed on down the germline, only to be discovered in subsequent generations when it is too late to extract them from the human genome, the techniques have not yet been adequately tested in non-human primates.

Drs Turnpenny and Fryer see no 'serious ethical issue' other than safety but this will be primarily because they do not object to embryo research per se, taking a gradualist view of the moral status of life before birth, which I do not share. But aside from that I contend that the risky and invasive harvesting of the necessary large number of human eggs from women, and the identity confusion of genealogically confused progeny are also 'serious' ethical issues.

I have recently reviewed thirteen possible approaches to mitochondrial disease of which 'mitochondrial donation' is just one.[10] My conclusion is that although gene editing fits best with the restoration model (if it can be done as safely in humans as in mice), adoption (of embryo, baby or child) or choosing to care for a baby with special needs resonate most with the redemptive Father heart of God.

***Peter Saunders***
*CMF Chief Executive*


1. Saunders P. Three-parent embryos: Unnecessary, unsafe and unethical. *Triple Helix*, Spring 2015:5 *bit.ly/1GKfpX2*
2. Taylor P. Three parent embryos for mitochondrial disease. *CMF Files* 51, 2013 *bit.ly/1C01AGg*
3. Mitochondrial disease. Over 20 blogposts on three parent embryos for mitochondrial disease published between 2010 and 2015. *CMF Blogs bit.ly/1KnyJix*
4. Evidence to the House of Lords' Secondary Legislation Scrutiny Committee on regulations to permit mitochondrial donation. *CMF*, 6 January 2015 *bit.ly/1lKe83C*
5. Response to the House of Commons Science and Technology Committee Inquiry into mitochondrial donation. *CMF*, 22 October 2014 *bit.ly/1GWSYkK*
6. Submission to the Department of Health on draft regulations for mitochondrial donation. *CMF*, 21 May 2014 *bit.ly/1LFSZh9*
7. Submission to the US Food and Drug Administration on mitochondrial donation. *CMF*, 15 October 2013 *bit.ly/1KntUpf*
8. Submission to the HFEA Review of scientific methods to avoid mitochondrial disease. *CMF*, 7 November 2012 *bit.ly/1LFTibQ*
9. Submission to the Nuffield Council on Bioethics on the ethics of mitochondrial donation. *CMF*, 24 February 2012 *bit.ly/1NsnzJp*
10. Saunders P. Thirteen 'solutions' to mitochondrial disease assessed. *CMF Blogs*, 24 May 2015 *bit.ly/1LGOvsg*