Anscombe Centre Raises Ethical Problems with 'Three Parent Baby' Genetic Manipulation

Following the news that the first 'three parent' baby had been born, the Anscombe Centre is reiterating the ethical issues with so-called 'mitochondrial donation treatment' (MDT) which led to this event.

Every cell in a human body contains a *nucleus*, the core of the cell wherein the central DNA of an individual is located, and also *mitochondria*, which are organelles, tiny organs that perform specific jobs in the cell. Specifically, mitochondria are like miniature stomachs – they convert energy derived from outside of the cell (e.g. converted nutrients from our food), into energy that can be used within the cell. There are hundreds of mitochondria in every cell, and in the ovum, the egg cell, because it is so large there are hundreds of thousands of mitochondria.

When the woman's egg is fertilised by the man's sperm a new individual is conceived, a human embryo. The mitochondria within this new human being come entirely from the egg, that is, from the child's mother. Unfortunately, when a mother's mitochondria contain malfunctioning DNA, this may cause serious disorders which are inherited by their children.

MDT is a set of in-vitro fertilisation techniques that aim to generate children who are genetically related to women with faulty mitochondria but who do not carry the faulty mitochondria. The technique that was used to generate the new baby whose birth was announced today was pro-nuclear transfer (PNT). This involves:

- Fertilising an egg from the woman with the faulty mitochondria with the sperm of the intended biological father to create one new embryonic human individual (E1) who will have his or her mother's faulty mitochondria;
- Fertilising an egg from a woman with healthy mitochondria to create another new embryonic human individual (E2) who will have his or her mother's healthy mitochondria;
- Then removing the nuclear material (contained in two *pronuclei*) from the E2 and replacing it with pronuclei from E1, creating a third embryonic human being (E3) who has the nuclear DNA of the father and of one mother, but the rest of the embryo, including the mitochondria from the egg donor mother.

It is misleading to call this 'mitochondrial donation', as if mitochondria are being 'donated' like organs. This is because the healthy mitochondria of E2 are not transferred into E1, but rather the pronuclei of E1 are placed into the body of E2. It is a form of cell nuclear transfer. Indeed, both E1 and E2 are functionally destroyed by the removal of their pronuclei, and parts of both used to create a third embryonic human, E3. This is the destruction of two embryonic human individuals to create a third individual.

This is primarily unethical due to the destruction of two unique innocent human beings, who had inherent dignity and rights. It is also unethical for two other reasons: the fracturing of biological parenthood, and the potential for serious unintended consequences.

The use of an 'egg donor', or a donated embryo, results in three biological parents – the biological father, the nuclear-genetic mother, and the egg mother. The egg mother's identity is erased by this method of conception, without adding to the safety of standard egg or embryo donation. This has serious implications for the identity of the newly created baby, who will now have no right to identify information about her egg mother when they grow up. Given the unnecessary suffering caused in the past by denying children the opportunity to know about their biological parents, initially, after adoption, and then later in relation to IVF with sperm or egg 'donors', it is a grave injustice to repeat such a mistake a third time.

Further, transfer of nuclear DNA is a form of genetic engineering which affects the human germline. It is a mistake to assume that the nucleus and the mitochondria have no deeper connection, and that the former can be transferred without any consequence. Indeed, as Dr Paul Knoefler pointed out when the ethics of these techniques were being discussed around the time of their legalisation in 2015, '[t]here is strong evidence that the mitochondrial genome, for example, "talks to" the nuclear genome, and has pervasive effects on cellular and organismal functioning'.

Given this, those scientists engaging in MDT techniques do not know what problems might be caused and passed on to the children of those who are conceived in this way. As our Director, David Albert Jones, argued in 2015: '[MDT] crosses the Rubicon into the deliberate genetic manipulation of future generations, which has been widely prohibited and condemned by various international declarations'.

No-one should regret the birth of another human being, but the ethical problems and concerns raised by MDT techniques remain and must be borne in mind in any discussion of this issue.

Professor David Albert Jones, Director of the Anscombe Bioethics Centre, said:

"Every child newly conceived is to be welcomed and we hope this new human life brings joy to his or her parents, but some way of conceiving children involve risks or harms to the child. This is a new and unnecessary technique that does not add to the safety of IVF involving an egg donor, but adds further risks. As with all IVF involving egg or sperm donors, this fractures parenthood and it is essential that the child is at least given identifying information about his or her egg donor parent. It is a fundamental human right to know about our biological origins".

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Notes to Editors:

- For a deeper analysis of the issues concerning mitochondrial 'donation', see this previous article by our Director.
- For more information on the Anscombe Bioethics Centre, see our website: www.bioethics.org.uk.
- For interviews or comment, contact: media@bioethics.org.uk or 07900925708.

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