

Exclusive: '3-parent' baby method already used for infertility

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SiYi Qian/Getty

By Andy Coghlan

The first babies to be created using a “three-parent” method to overcome their parents’ infertility are due to be born in early 2017. *New Scientist* has learned that two women in Ukraine are both more than 20 weeks pregnant with fetuses created using such a technique.

The babies would be the first born to women who had the procedure to treat infertility, rather than to prevent hereditary disease, but some have criticised this approach, calling for it to be banned until there is more evidence that the embryos it creates are healthy.

The technique used is the same as that approved last year by the UK parliament – the only country in the world to legalise the procedure – although there it is allowed only to prevent parents passing hereditary diseases to their children.

No three-parent babies have been born in the UK yet, but a handful have been born elsewhere. Last month, *New Scientist* exclusively revealed that a Jordanian couple had had a healthy baby after using a new three-parent technique.

In Ukraine, the UK-approved method was used to overcome embryo arrest, which happens when IVF embryos suddenly stop growing at around the two-cell stage, says Valery Zukin, director of the Clinic of Reproductive Medicine in Kiev.

“One, a girl, has now reached 26 weeks, and a boy has reached 20 weeks,” Zukin told *New Scientist*. He says his team is due to present their preliminary results at the American Reproductive Technology Congress in New York later this week.

Too risky?

Zukin’s team used a technique called pro-nuclear transfer. In each case, they fertilised both the mother’s egg and the egg of a donor with sperm from the husband. Then, using a fine needle, they extracted the “pronucleus” from the mother’s fertilised egg – the cell body that contains the chromosomes of both the mother and father. This was then used to replace the pronucleus in the fertilised donor egg, creating an embryo that had a full set of chromosomes from the parents, but potentially healthier cellular machinery around it.

The idea is that there are factors within a cell’s cytoplasm that can help or hinder fertility – such as enzymes that help cells grow and divide. By placing the pronucleus into a cell that was created using the egg of a different woman, the hope is that whatever caused the embryo arrest can be avoided.

But Dean Betts at Western University in Canada says the reasons why embryos arrest are poorly understood. While we can hypothesise why [the process] works, “it doesn’t mean the underlying reason why the embryo arrested in the first place is gone, possibly allowing development of an abnormal embryo”, he says.

“I think it’s too risky,” says Betts. “More research is needed, and I highly recommend banning this procedure in humans as we don’t know enough to ensure its safety.”

Zukin says the procedure was first approved by an ethical committee and a review board at the Ukrainian Association of Reproductive Medicine. Early DNA tests – including some conducted by an independent laboratory in Germany – have shown that the two babies are genetically healthy, he says. Zukin is also waiting before repeating the procedure. “Some patients are awaiting similar embryo transfers, but we would like to be sure first that the babies are born healthy,” he says.

Ethical issues

Zukin isn’t the first to try using such a method to treat infertility related to embryo arrest. John Zhang at the New Hope Fertility Center in New York, who treated the Jordanian couple, attempted a similar procedure in 2003 and recently published an account of his results (*Reproductive Biomedicine Online*, DOI: 10.1016/j.rbmo.2016.07.008).

While his team were able to produce three healthy fetuses, carried in a single pregnancy by the same woman, they all died. One fetus was removed at 33 days, to relieve the pressure of bearing triplets, but the remaining two then died at 24 and 29 weeks respectively, due to rupturing membranes and umbilical cord prolapse.

But Zhang’s analysis of fetal tissue revealed they all had normal chromosomes, leading his team to conclude that the technique could potentially be used to overcome embryo arrest.

Extending three-parent techniques to treating infertility raises ethical questions. If they work, they will dramatically increase the number of prospective parents who could benefit from mitochondrial transfer. An estimated 50 per cent of IVF procedures fail because embryos stop growing before they can be implanted.

A key argument considered in the UK parliament last year was that, for women with serious mutations in their mitochondria, there are no other possible treatments. But there are already many options for treating infertility, meaning some may be less happy to see it used for this purpose.

“There is much debate, and indeed, much pressure from the fertility world to get this treatment accepted,” says Bert Smeets at Maastricht University in the Netherlands. “It’s obvious that the fertility market is much bigger than the group of patients with mitochondrial disease.”