IVF Updates: Three-Parent IVF babies could be born next year

The United Kingdom has recently cleared the way for fertility clinics to start making babies using three-parent IVF beginning October, a move that could make certain genetic diseases non-existent. This means that first such babies could be born next year.

Overview

Mitochondria are the powerhouses of cells. They are the tiny compartments inside nearly every cell of the body that convert food into useable energy, supplying to the rest of the cell. They contain their own set of DNA with 37 genes, which does not affect characteristics such as appearance.

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All of our mitochondrial DNA (mtDNA) is inherited solely from our mothers. Sperm carry mitochondria in their tails, but the small quantities present are destroyed after fertilization, even if they manage to penetrate the wall of the egg. Mitochondrial DNA doesn’t carry information about specific traits such as hair color, skin color and eye color (all of these information comes from the nucleus), but when a mother passes abnormal mitochondrial DNA, the embryo might develop with mitochondrial disease. Mitochondrial diseases tend to strike in childhood and get steadily worse. They often prove fatal before adulthood. The baby could have an incurable disease which often has devastating impacts on the heart, brain, liver and muscles. Conditions include Leigh’s disease, progressive infantile poliodystrophy and Barth syndrome. Faulty mitochondria have also been linked to more common medical problems, including Parkinson’s, deafness, failing eyesight, epilepsy and diabetes. The child may live only a short time after birth. Most do not live to adulthood.
What is a 3-Parent IVF?

A 3-Parent IVF is a fertility treatment that creates an embryo using the genetic material (DNA) from three people; the parents and an egg donor.

The 3-Parent IVF is also called as mitochondrial donation. It is like a tiny transplant, replacing the defective mitochondria with a healthy one, from the “third parent”— a “second mother”, who is actually the mitochondrial donor. IVF can then be performed on the egg, leading to a child with around 30,000 genes from the parents who provided the egg and sperm, and 0.1% of the child’s genetic code from the mitochondrial donor.

Mitochondrial Disease Prevention

One option in preventing passing on mitochondrial disease is IVF with Pre-implantation Genetic Diagnosis (PGD), which can pick up mitochondrial mutations. If the parents are willing to abort an affected foetus, they can have chorionic villus sampling at 10-12 weeks, or amniocentesis at 14-20 weeks. Both can pick up mitochondrial diseases, but they carry a small risk of miscarriage. However, for some women, these tests are no use because all of their eggs carry substantial mitochondrial mutations.

3-Parent IVF as solution

Right now, three-person IVF is for women who have a rare defect in their mitochondrial DNA. These women often have miscarriages or stillbirths. The only fertility options for such women have been IVF using an egg donor or adoption. Three-parent IVF instead gives these women a chance to have a healthy, genetically related child. It also prevents mitochondrial defects from being passed down to future generations.

Researchers have estimated that about 4,000 children in the US and 6,500 in the UK are born with mitochondrial disease, making this breakthrough an important step in reducing its prevalence worldwide.

Techniques

There are several techniques available, but in general, it uses a modified version of IVF wherein the nuclear DNA from the mom’s egg is replaced with healthy mitochondrial DNA from an egg donor. This results in babies with 0.1% of their DNA from the second woman and is a permanent change that would be passed down through the generations. Two of the several possible techniques are the Maternal Spindle Transfer (MST) and Pronuclear Transfer (PNT).

The simpler of the two is called maternal spindle transfer (MST). First, scientists use standard IVF treatment to collect eggs from the mother. Then, they remove the nucleus from one of the mother’s eggs and transfer it into a healthy donor egg that has had its own nucleus removed. The reconstituted egg holds all of the mother’s healthy nuclear DNA, or 99.8% of her genes, plus the donor’s healthy mitochondria. This egg is then fertilized with the father’s sperm and the embryo is implanted into the mother like any other IVF embryo.

Maternal Spindle Transfer (MST)
Pronuclear Transfer (PNT)

Concerns
The recent approval of the UK court with this procedure sparked hot debate. Proponents say it is a good news for progressive medicine and will help save babies’ lives. But critics say they will continue to fight against the technique that they say raises too many ethical and safety concerns. Others also believe it’s an ethical dilemma that opens the door for “made-to-order” kids.

Mitochondrial transfer passes on genetic changes from one generation to another. That raises ethical concerns because any unexpected problems caused by the procedure could affect people who are not yet born, and so cannot give their consent to have the treatment. Mitochondria are not completely understood, and the DNA they hold might affect people’s traits in unknown ways. For that reason, some scientists believe mitochondria should be better understood before the procedures are legalized. The Church of England says it is not opposed in principle, but wants to see more scientific research and debate on the ethics, safety and efficacy before the law is changed (Sample, The Guardian).

Sources

Miri® inspired embryologists in an IVF workshop held in Ukraine

Miri® TL Time Lapse Embryo Incubator was used in a 4-day workshop organized by Stoik Company. The workshop was held on November 9-12 in Clinic Nadiya at Kiev, Ukraine.

Several experts shared their knowledge on the following;
- Embryo Morphokinetics
- Oocyte and Embryo Vitrification
- Demonstration on Intracytoplasmic Injection (ICSI)
- Quality Control of embryological laboratory work
- Main indicators of embryological laboratory work
- Development of algorithm for morphokinetic selection of embryos
- Trofetoderma biopsy
- Molecular diagnostics methods in PGD program
- Selection of embryos for embryo transfer based on morphokinetic indicators

Discussions during the workshop at Clinic Nadiya
Miri® TL was used in the discussion and demonstration in the development of algorithm for morphokinetical selection of embryos and selection of embryos for embryo transfer based on morphokinetical indicators discussed by our colleagues Jesper Lindhardsen and Evaldas Pesiunas, respectively.

Miri® TL worked very well and gave excellent results during the demonstration. Miri® TL showed how easy and accurate selection of embryos can be and these have been the reasons why some of the attendees have decided to purchase the product. The workshop was attended by more than 40 embryologists from Ukraine, Kazakhstan and Moldova.

**Miri® at San Carlos Clinic in Italy**

San Carlos Clinic in Turin, Italy is a private clinic specializing in in-vitro fertilization (IVF) reproductive treatments. They cooperate with the Institute of Reproductive Medicine and Gynecology and with the Centre of Research in Bioclimatology, Biotechnologies and Natural Medicine in State University of Milan.

The clinic was using a conventional CO₂ Incubator and due to its low temperature stability, they lose some cycles and embryos. Until Prof. Menaldo saw Miri® Benchtop Multi-room Incubator at ESHRE in Lisbon and in other international references, and purchased this innovative and revolutionary IVF Incubator. With their new Miri® Incubator, higher pregnancy success rates can be achieved.
Esco on the move

Esco is committed in delivering innovative tools to uphold its promise of meeting every customer’s needs and even exceeding their expectations by continuous research and development. Esco wants to ensure that every need is met and each laboratory all over the world would benefit from the safe and reliable features that our products offer. Hence, we actively participated in various conferences and trade shows to bring you solutions.

FSA 2015

It was nice to meet the crowd behind the successful and ever-growing IVF community of Australia / New Zealand during the Fertility Society of Australia (FSA) Annual Conference held on Sept 13-16 at the National Convention Centre, Canberra ACT.

We are truly ecstatic to have your positive response on the introduction of our Mini® Benchtop Multidroom Incubator and Mini® TL Time-Lapse Incubator. We would like to thank everyone who gave inputs. Those would be of great help to our future product development efforts.

On behalf of the Esco Medical Team, we hope you have enjoyed the Conference and learned as much as we did. Do continue to follow our progress. We are ever motivated and committed to deliver products at the highest level of technology, quality with competitive prices in line with the ever growing needs of IVF in Australasia.

The 17th Chongqing ART Conference

The theme of this year’s conference is “embryo culture.” As of this theme, organizer has invited local and foreign IVF experts to conduct academic and knowledge exchange about the effectiveness and safety of embryo culture conditions from single embryo cryopreservation to embryo transfer and other cutting-edge technology and latest development outcome. Esco Medical was invited to attend the meeting. During the meeting, we have showcased the full range of our IVF products and received a great response from the end users. Meanwhile, from Israel, Esco products loyal users - DIANA Stein as an invited experts, have presented a topic entitled: “Introducing time-lapse into a clinical setting”, and received positive feedbacks from the audiences.

The visitors showed great interest in the multi-core cell morphology determination feature and abnormal cleavage kinetics analysis of Mini® TL Time Lapse Embryo Incubator. Besides that, visitors are very pleased knowing that Mini® TL is a non-invasive embryo culture equipment. Its embryo development analysis features greatly reduce the workload and increase productivity.

The 17th Chongqing ART Conference was held on November 12-14 at Chongqing International Convention and Exhibition Center.

Since the first organization of microscopic insemination assisted reproduction workshop by Obstetrics and Gynecology Hospital of Chongqing in year 1999, it has been successfully held and now in its 17th meeting of Assisted. Renowned experts from around the world were invited to share their latest achievements in IVF researches. Chongqing assisted reproductive meeting has become the academic status of China’s most influential and largest professional ART conference.
ASRM 2015

American Society for Reproductive Medicine (ASRM) Annual Meeting, held on October 17-21 at Baltimore Convention Center, Maryland, USA, is indeed a very successful and enjoyable experience for Esco Medical. We are truly grateful for those who visited us and showed interest in our products. We are also grateful to our existing users, our loyal customers, who also paid a visit to see our newest product, Semi Closed Environment (SCE) for ICSI and IVF, to learn how it can help them in their everyday routine. Miri® Multi-room Benchtop Incubator, Miri® TL Time Lapse Embryo Incubator, Fertilisafe™ Multi-zone IVF Workstation, Miri® GA Gas and Temperature Validation Unit, and Miri® GA Mini Gas Validation Unit are also presented in the booth.

We have received overwhelming positive responses and inputs that will guide us as we develop some more advanced innovative technologies for the IVF industry. With the responses and support that we get from our clients around the world, Esco Medical is becoming more committed and determined to work even harder and provide the IVF industry with top-of-the-line products that will address its ever growing requirements and demands.

The 4th ISPF World Congress

Esco supports the missions of the International Society for Fertility Preservation (ISPF) by increasing the awareness of the IVF community on high technology equipment.

The 4th ISPF World Congress took place in Shanghai, China on November 13-15, where Esco took part and exhibited our Miri® Multi-room Benchtop Incubator. It was our pleasure that we were able to present its excellent features which attracted several guests during the exhibit. The International Society for Fertility Preservation is an international nonprofit organization, wholly independent of government, founded upon the guiding principles of integrity and diversity of all international societies. Its role is leading and promoting progress in fertility preservation by international cooperation and collaboration. The ISPF is dedicated to scientific innovation and advances in medical care in the field of fertility preservation.

Learn the latest from Esco, meet us at following events

**Pacific Coast Reproductive Society**
March 9-13, 2016
Rancho Mirage
California, USA

**Counselor Physicians Scientists**
May 4-6, 2016
Austin, Texas

**American Association of Bioanalyst**
May 12-14, 2016
Las Vegas, Nevada, USA

**In Vitro Fertilization and Embryo Transfer**
July 17-20, 2015
San Diego, California, USA

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