

Newcastle  
Mitochondrial  
Reproductive  
Clinic

**NHS**  
The Newcastle upon Tyne Hospitals  
NHS Foundation Trust



Our Service

# Fertility Options At A Glance

Here is a quick 'at a glance' guide to our fertility care options. All options will be discussed during your clinical consultation, and IVF options will be covered more in depth later in the booklet.



## VOLUNTARY CHILDLESSNESS

You may decide after consultation that you would prefer not to have children. If this is the case we will support you during and after the decision making process.



## ADOPTION

If during your clinic visit you decide you would like to pursue adoption we can put you in touch with the appropriate services.



## EGG DONATION

Egg donation is where an egg is taken from an unrelated female, fertilised usually with your partner's sperm, and the resulting embryo is transferred into your womb.



## PGD

This technique involves a couple going through an IVF cycle. Before the Embryo is transferred into the womb cells are removed and tested for mitochondrial mutations.



## PREGNANCY WITH NO INTERVENTION

If you decide to get pregnant naturally with no medical intervention. It is possible to take cells from the pregnancy to test the baby for mitochondrial disease.



## MITOCHONDRIAL DONATION

This is an IVF based technique that involves replacing the faulty mitochondria in an egg with healthy mitochondria from a donated egg.



**Our Nurse Consultant and clinical team are on hand to help answer any questions you may have.**



**The NHS Highly Specialised Service for Rare Mitochondrial Disorders and the Newcastle Fertility Clinic work together to provide a comprehensive fertility care pathway for women with mitochondrial disease**

**The Mitochondrial Assisted Reproductive Technology (Mito-ART) clinic is based at the Newcastle Fertility Centre at Life, Newcastle.**

**The Mitochondrial Reproductive Advice Clinic (MRAC) is based in the Royal Victoria Infirmary, Newcastle.**



# Clinic Overview



The Mitochondrial Assisted Reproductive Technologies (Mito-ART) clinic is based within the Newcastle Fertility Centre at Life in Newcastle

This clinic will offer more in depth information and assess suitability for IVF-based techniques (including PGD and Mitochondrial Donation) for women who have mitochondrial DNA mutations.

The Mitochondrial Reproductive Advice Clinic (MRAC) is based within the Royal Victoria Infirmary in Newcastle.

This clinic will review and confirm the genetic diagnosis, assess fitness for pregnancy from a mitochondrial disease perspective and offer psychological support and advice regarding reproductive options. Including IVF- based techniques such as pre-implantation genetic diagnosis (PGD) and Mitochondrial Donation. Once assessed in this clinic, and if considered appropriate, you will be referred to the Mitochondrial Assisted Reproductive Technologies (Mito-ART) Clinic.

- ⊕ Our clinics are multidisciplinary with healthcare professionals working together to give you the best possible care
- ⊕ Both clinics are based in Newcastle Upon Tyne
- ⊕ Contact your GP or local healthcare provider for referrals

If you are interested in attending our clinic please ask your GP or healthcare provider to write to:

Dr G. Gorman  
Mitochondrial Reproductive Advice Clinic  
The Royal Victoria Infirmary  
Newcastle  
NE1 4LP



# Egg Donation

**What is egg donation?** This is an IVF treatment that may be suitable for some women who have been diagnosed with an mtDNA mutation and wish to remove the risk of passing this to their children. It involves using an egg from a donor that contains healthy mitochondria, which is fertilised in the laboratory using the partner's sperm. The child will be genetically related to the egg donor and the father (see diagram below) but will not be genetically related to the woman with the mtDNA mutation. The woman with the mtDNA mutation will carry the pregnancy and give birth to the baby.

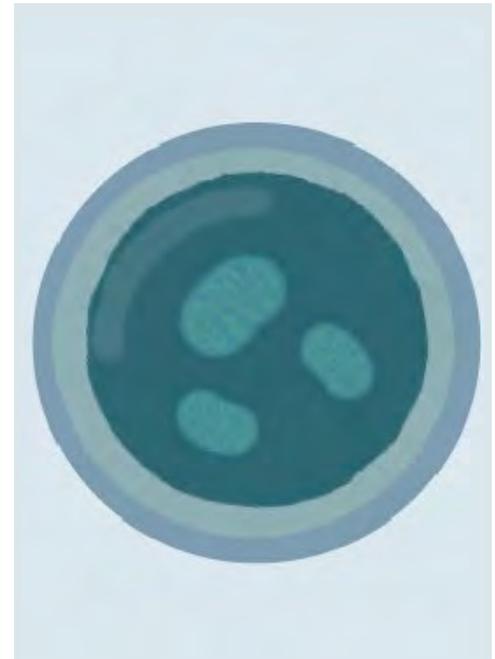
**What does it involve?** As egg donation is an IVF treatment, it involves the fertilisation of eggs in the laboratory. The egg donor takes medication to stimulate her ovaries to produce a number of eggs which can be collected for use.

**What happens next?** The donated eggs are fertilised in the laboratory using the partner's sperm and resulting embryos grown in an incubator for 3 to 5 days. Embryo growth is monitored during this time and embryo(s) selected (where possible) for transfer to the womb. The embryo transfer involves inserting a fine tube through the cervix and into the womb. To prepare for this, the woman receiving the egg is usually required to take medication, which may include injections, tablets and pessaries, for several weeks both before and after embryo transfer.

**How do I know if the treatment has worked?** Around 9 days after embryo transfer, a pregnancy test will be done. If this blood test is positive, the pregnancy will be confirmed 3 weeks later by vaginal ultrasound scan to check the baby is growing. If the pregnancy test is negative, there will be an opportunity to discuss this in detail with specialist doctors.

**Where do the donor eggs come from?** There may be a waiting list for a suitable egg donor. In some cases, couples may provide their own donor. It is important when using egg donation to prevent mitochondrial disease, however, that the egg donor is not a close relative who may carry the same mtDNA mutation.

All donors are screened and counselled to ensure they are suitable.



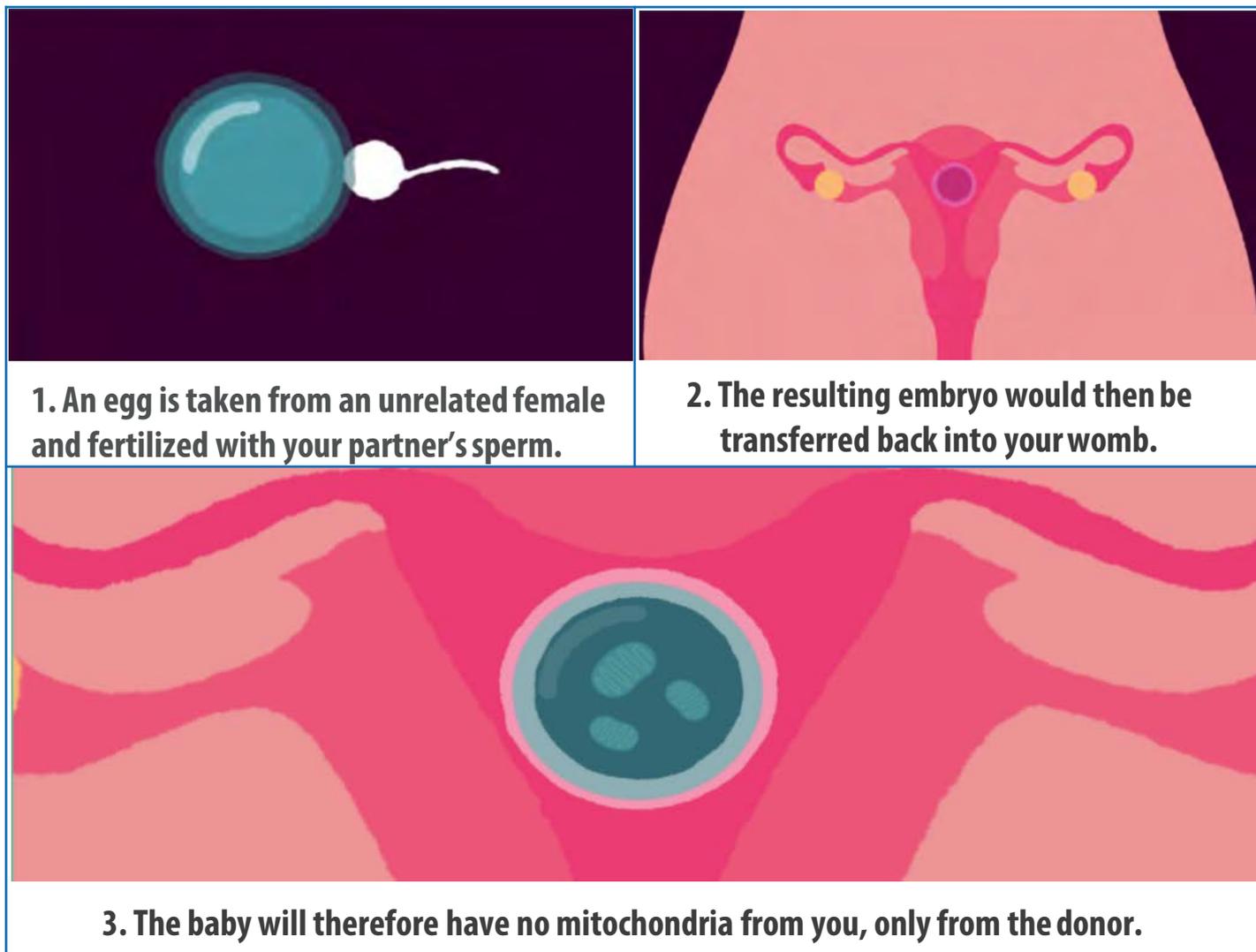
25-40%\*

This is the average success rate following IVF using a donor egg. This means that some couples may need a number of treatment cycles before a successful pregnancy is achieved. Although IVF success rates generally fall as women get older, in the case of egg donation, success rates relate to the age of the egg donor and not that of the egg recipient.

\*HFEA website (<http://www.hfea.gov.uk/80.html#4>)

# Egg Donation

## The process



### Who are the legal parents of the child?

In the UK, the birth mother is always the legal mother of a child even if the eggs have been donated. Her partner, if his sperm is used with his consent, is the other legal parent.

**Are there any risks?** The main risk in this treatment is multiple pregnancy. There are strategies to reduce this risk as far as possible and this will be discussed during your clinical visit.

### Can the egg donor be identified?

Children at the age of 18 may, if they wish, find out identifying information about the egg donor. Otherwise non-identifying information is available to the couple and the child as appropriate.

**How is this treatment funded?** Funding is available in many areas through local commissioning. It is often subject to restrictions, for example, female age.

# Pre-implantation Genetic Diagnosis (PGD)

**What is PGD?** It is an IVF treatment that may be suitable for some women who have been diagnosed with an mtDNA mutation and wish to reduce the risk of passing this to their children. It involves removing a cell from an embryo to test the level of faulty mitochondria and selecting a low-risk embryo for transfer to the womb.

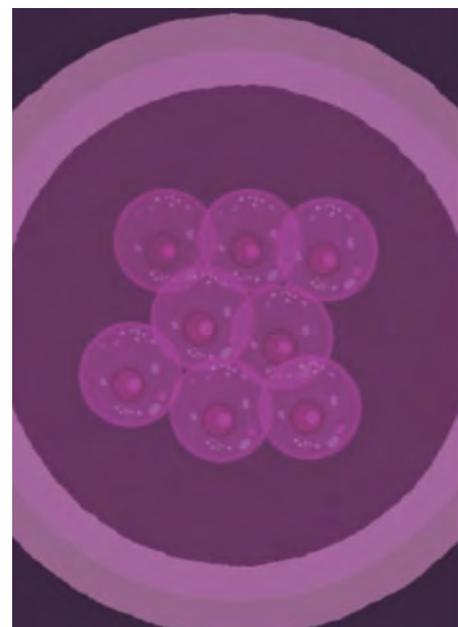
**What does it involve?** As PGD is an IVF treatment, it involves the collection of eggs and sperm for fertilisation in the laboratory. This requires the woman to take a course of medication (some by injection) to stimulate her ovaries to produce a number of eggs. The eggs are collected by passing a fine needle through the vaginal wall into the ovary under ultrasound control.

**What happens next?** The eggs are fertilised in the laboratory using the partner's sperm and left to grow in the incubator. As the embryo develops over the next few days, a cell (or cells) can be removed for genetic testing. The results are used to select an embryo(s) with low levels of faulty mitochondria that has reached the correct stage of development (where possible) for transfer to the womb. This involves inserting a fine tube through the cervix and into the womb. To prepare for this, the woman is usually required to take medication, which may include injections, tablets and pessaries, for several weeks both before and after embryo transfer.

**How do I know if the treatment has worked?** Around 9 days after embryo transfer, a pregnancy test will be done. If this blood test is positive, the pregnancy will be confirmed 3 weeks later by vaginal ultrasound scan to check the baby is growing. If the pregnancy test is negative, there will be an opportunity to discuss this in detail with specialist doctors.

**Who is suitable for PGD?** PGD will only be suitable for women who have eggs containing low levels of faulty mitochondria. This may depend on the particular mtDNA mutation and each case will need to be discussed with a specialist doctor. The HFEA have a list of conditions which licensed clinics may use PGD to test for.

This technique is only available to women with low levels of faulty mitochondria



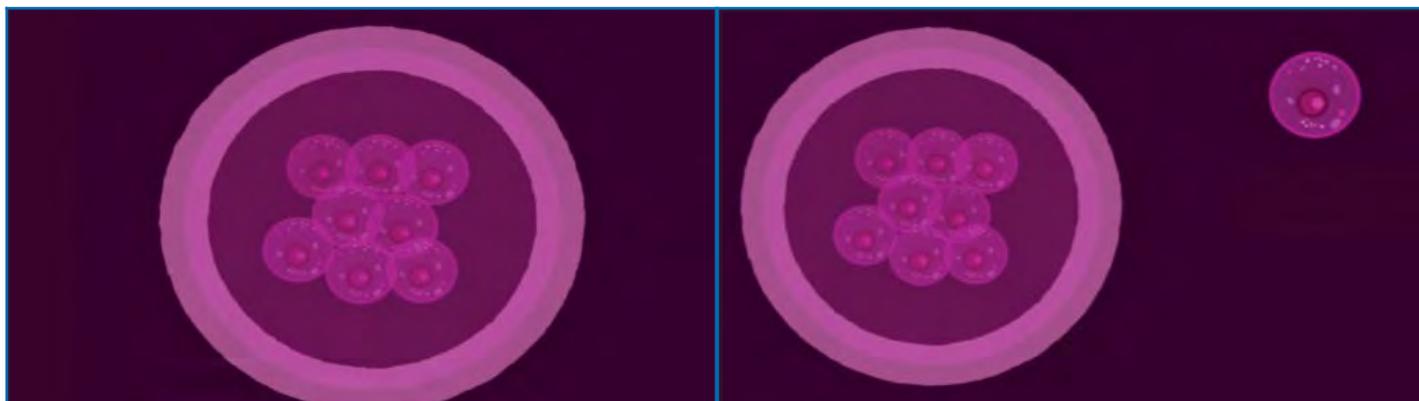
30%\*

This is the estimated success rate of PGD based on figures from 2010. This means that some couples may need a number of treatment cycles before a successful pregnancy is achieved. The success rates for IVF tend to fall as a woman gets older and so it is important for women to consider their reproductive options as early as possible.

\*HFEA website (<http://www.hfea.gov.uk/preimplantation-genetic-diagnosis.html#chance>)

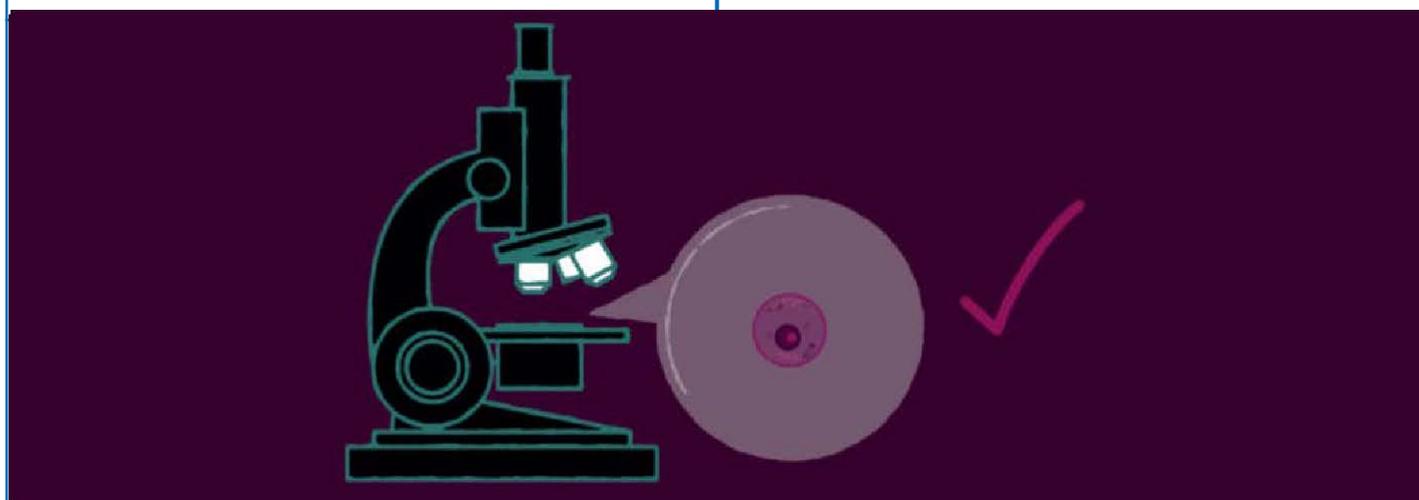
# PGD

## The process



1. The couple going through an IVF cycle to create an embryo.

2. Cells are removed from the resulting embryo to test for mitochondrial DNA mutations.



3. This means we are able to transfer embryos that are least likely to be affected.

**What are the risks?** Although PGD is an established IVF technique, its use for reducing the risk of mtDNA disease is relatively new and experience is still quite limited. The main risk is that there will be no suitable embryos for transfer to the womb, which could occur if all the embryos tested contain high levels of faulty mitochondria. If this is the case, further PGD will not be a suitable reproductive option and alternatives will have to be considered. Another risk is that the embryo most likely to result in a pregnancy may not be the embryo with the lowest level of faulty mitochondria and so a decision will have to be made, with help from specialist doctors, as to which embryo (if any) should be selected for transfer to the womb. This may depend on the particular mtDNA mutation.

**Is there any follow-up?** Women who are pregnant following PGD will be offered routine antenatal screening during their pregnancy. When the baby is born, it will be useful (but not compulsory) to collect samples to confirm the level of faulty mitochondria reported in the early embryo.

**How is this treatment funded?** PGD is nationally funded but there are some restrictions that apply, for example, female age.

# Pre-Natal Testing

**What is prenatal testing?** It is a form of testing that is carried out in early pregnancy and may be suitable for some women who have been diagnosed with an mtDNA mutation and wish to reduce the risk of having a severely affected child. It involves testing a small number of cells removed from the pregnancy, with the option of terminating the pregnancy if the level of faulty mitochondria is high.

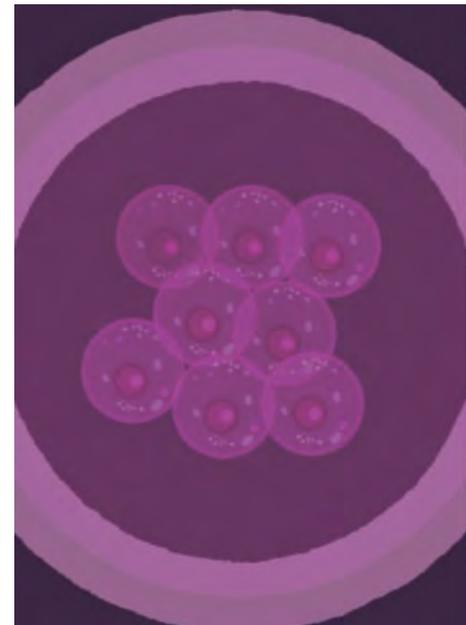
**What does it involve?** It involves the couple conceiving naturally, followed by removal of cells for genetic testing during early pregnancy. The cells can be removed either from the placenta (known as chorionic villus sampling, CVS) or the amniotic fluid surrounding the baby (known as amniocentesis) (see diagram above). CVS is usually performed between 11-14 weeks of pregnancy and amniocentesis between 15-20 weeks of pregnancy. Both involve a thin needle being inserted through the abdominal wall to collect the cells and takes around 10 minutes to perform. It is often described as uncomfortable rather than painful, with some women experiencing cramps similar to period pain afterwards.

**What happens next?** Genetic testing is performed to determine the level of faulty mitochondria within the cells that have been removed. If the level is low, parents can be reassured that the risk of mtDNA disease in the child will also be low. If the level is high, the risk of severe mtDNA disease in the child will be high and parents need to consider continuing with the pregnancy or terminating the pregnancy. Specialist doctors will provide advice and trained counsellors will be available for support. Most terminations are carried out before 24 weeks of pregnancy.

**How do I know if the treatment has worked?** Around 9 days after embryo transfer, a pregnancy test will be done. If this blood test is positive, the pregnancy will be confirmed 3 weeks later by vaginal ultrasound scan to check the baby is growing. If the pregnancy test is negative, there will be an opportunity to discuss this in detail with specialist doctors.

**Who can I contact for more information?** Regional obstetric services for your area. RVI for Newcastle

This technique is only available to women with low levels of faulty mitochondria



0.5-1%

This is the estimated risk of miscarriage associated with CVS and amniocentesis. Other risks can include infection or having to repeat the test due to an unsuitable sample.

# Mitochondrial Donation

**What is mitochondrial donation?** It is an IVF treatment that may be suitable for some women who have been diagnosed with an mtDNA mutation and wish to reduce the risk of passing this to their children. It involves replacing the faulty mitochondria in an egg with healthy mitochondria from a donated egg. The only mitochondrial donation procedure currently licensed in the UK is known as pronuclear transfer.

**What does it involve?** As mitochondrial donation is an IVF treatment, it involves the collection of eggs and sperm for fertilisation in the laboratory. This requires the woman to take a course of medication (some by injection) to stimulate her ovaries to produce a number of eggs. The eggs are collected by passing a fine needle through the vaginal wall into the ovary under ultrasound control. The entire process may need to be repeated over several months (up to 3 times) to ensure sufficient eggs are collected for treatment.

**What happens next?** The eggs are fertilised in the laboratory using the partner's sperm. Mitochondrial donation is performed and the embryos grown in an incubator for 5 days. Embryo growth is monitored during this time and a single embryo selected (where possible) for transfer to the womb. This involves inserting a fine tube through the cervix and into the womb. To prepare for this, the woman is usually required to take medication, which may include injections, tablets and pessaries, for several weeks both before and after embryo transfer.

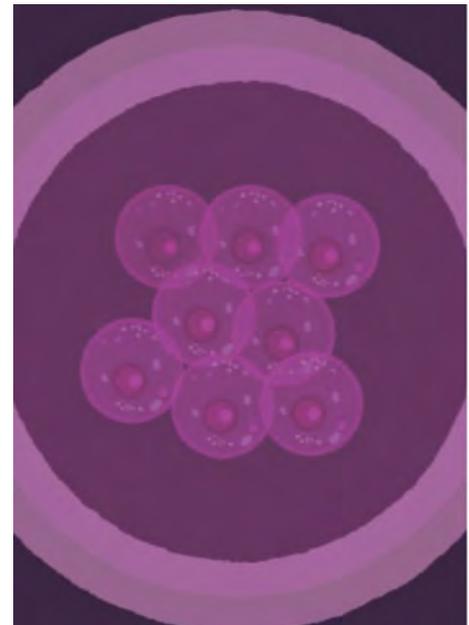
**How do I know if the treatment has worked?** Around 9 days after embryo transfer, a pregnancy test will be done. If this blood test is positive, the pregnancy will be confirmed 3 weeks later by vaginal ultrasound scan to check the baby is growing. If the pregnancy test is negative, there will be an opportunity to discuss this in detail with specialist doctors.

**How successful is it?** It is not yet possible to estimate the success of mitochondrial donation and success cannot be guaranteed. The success rates for IVF tend to fall as a woman gets older and so it is important for women to consider their reproductive options as early as possible.

**How is this treatment funded?** Mitochondrial Donation is NHS funded for people living in England. Scottish, Welsh and Irish referrals need to have funding through local health boards

**Who can I contact for more information?** Newcastle Fertility Centre at life have the only licence in the UK.

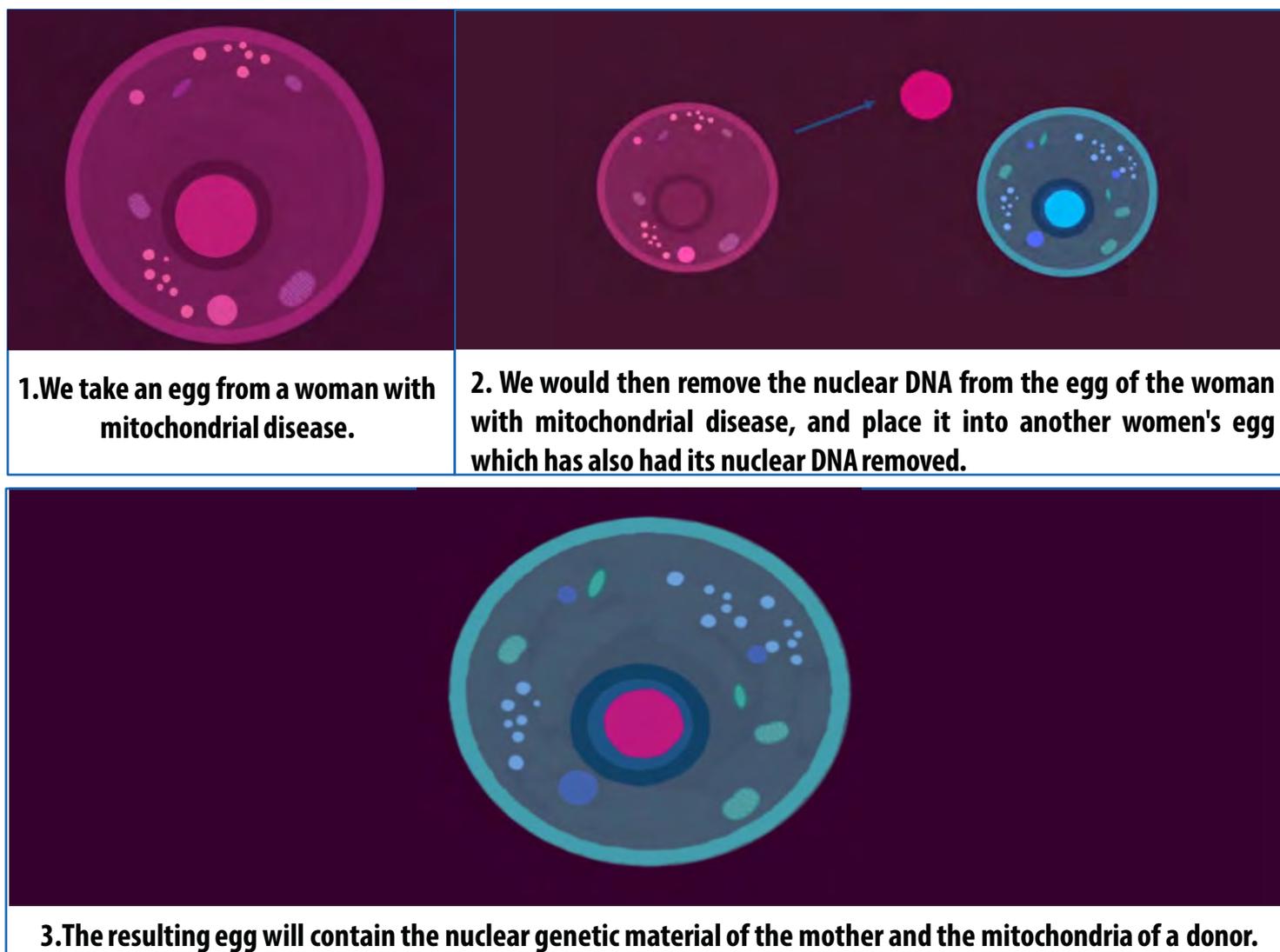
Newcastle Fertility Centre at life have the only licence in the UK to perform Mitochondrial Donation.



**Who is suitable for mitochondrial donation?** Mitochondrial donation can only be offered when there is a risk that the eggs collected from the woman will contain faulty mitochondria and there is significant risk that this will lead to serious mitochondrial disease in the child. This means that mitochondrial donation may be suitable for women who have only faulty mitochondria, or high levels of faulty mitochondria, within their eggs. This may depend on the particular mtDNA mutation and each case will need to be discussed with a specialist doctor. An application will be submitted to the regulatory body (HFEA) for approval.

# Mitochondrial Donation

## The process



**What are the risks?** Because the use of mitochondrial donation as a clinical treatment is new and experience is limited, there may be unknown risks. Extensive preclinical research carried out in our Centre suggests that mitochondrial donation does not affect how early embryos grow and that these embryos have the potential to give rise to a healthy pregnancy. The research also shows that a small amount of faulty mitochondria can be transferred to the donated egg during the mitochondrial donation procedure and that, on rare occasions, this level could increase as the embryo develops in the womb. For this reason, it is recommended that women who become pregnant following mitochondrial donation consider prenatal testing to confirm that the baby has low levels of faulty mitochondria.

**Is there any follow-up?** All pregnant women are offered routine antenatal screening during their pregnancy. Women who are pregnant following mitochondrial donation will be offered the same screening with additional tests, including prenatal testing. This involves sampling a small number of cells from the pregnancy whilst the baby is growing in the womb and does carry a small risk of pregnancy loss. When the baby is born, it will be important (but not compulsory) to collect samples to confirm that the level of faulty mitochondria is low. Longer term medical follow-up will also be important to ensure there are no unexpected health problems for the child.

# Your Clinical Staff

All of our clinical and allied healthcare staff are dedicated to giving you the best possible fertility care and advice. The team members you may speak to or see in clinic are shown below.



**+** **Mrs Bernadette Caygill**  
Administrative Manager



**+** **Dr. Meenakshi Choudhary**  
Consultant Gynaecologist



**+** **Catherine Feeney**  
Nurse Consultant



**+** **Dr. Grainne Gorman**  
Senior Clinical Lecturer and Honorary  
Consultant Neurologist



**+** **Prof. Mary Herbert**  
Professor of Reproductive Biology



**+** **Dr. Louise Hyslop**  
Clinical Embryologist



**+** **Prof. Robert McFarland**  
Professor of Paediatric Mitochondrial  
Medicine & Consultant Paediatric  
Neurologist



**+** **Dr. Jane Stewart**  
Consultant in Reproductive Medicine



**+** **Prof. Sir Doug Turnbull**  
Professor of Neurology and director of  
the Wellcome Centre for Mitochondrial  
Research.

# Contact Us



**The Mitochondrial Reproductive Options Clinic address is  
The Royal Victoria Infirmary,  
Queen Victoria Rd,  
Newcastle upon Tyne,  
NE1 4LP.**

**The MitoART clinic is located in **the Fertility Centre at Life  
Centre For Life,  
Times Square,  
Newcastle upon Tyne,  
NE1 4EP.****

 **0191 282 4876**

For more information about our Clinic please ring Mrs Bernadette  
Caygill on the number above