Wales Fertility Institute

PRE IMPLANTATION GENETIC SCREENING (PGS)

PATIENT INFORMATION

1 WHAT IS PREIMPLANTATION GENETIC SCREENING?

Preimplantation Genetic Screening (PGS), now known as PGTa (preimplantation testing for aneuploidy) is a specialised, state of the art, diagnostic technique that is performed at a very early stage of embryo development to determine the chromosomal status of embryos. It is an adjunct or "add-on" to routine IVF/ ICSI treatment.

To perform PGTa, patients embark on a standard cycle of IVF/ ICSI. On day 5 or 6 of embryo development, the embryos are biopsied and between 5-10 cells are removed from the trophectoderm of the embryo. The embryos are then vitrified and stored whilst the cells are sent to a specialised laboratory for genetic analysis by a process call next generation sequencing (NGS). Once the results are known we can arrange for you to start a frozen embryo transfer (FET) cycle and have the chromosomally normal embryos replaced.

2 WHAT IS INVOLVED IN A PGS TREATMENT CYCLE?

The only way to create a sufficient number of embryos for PGS is through IVF treatment. For the woman this may involve:

- Depending on the treatment protocol daily injections for approximately 2 weeks to suppress pituitary activity
- A further 2 weeks of hormone injections to stimulate the ovaries to produce more than the usual number of eggs
- Regular blood tests and ultrasound scans in order to monitor response
- A final injection to assist the eggs to mature
- A small operation to collect the eggs 36 hours after this injection
- If embryos are created, they are allowed to develop.

Up to this point the process is the same as standard IVF/ICSI treatment. You will be given more detailed information about the treatment at a later stage.

3 HOW IS PGS PERFORMED?

PGS can be performed at various stages, either on oocytes or embryos. Normally it will be performed at day 5 (blastocyst) stage, this will be discussed with you by your doctor and at your consultation with one of our embryologists.

Approximately 5-10 cells are removed from the blastocyst in a technique called biopsy, the embryos will then be cryopreserved (frozen) and stored. They would then be transferred in a subsequent frozen embryo transfer cycle (FET) once the results from the testing have been received.

The material that is removed from the embryos is analysed using a technique called Next Generation Sequencing (NGS) which provides information about all 23 pairs of chromosomes. This test is performed at an external genetics laboratory and the results will be available approximately 4 weeks after biopsy.

Embryos that have a normal result can be transferred in a subsequent frozen embryo transfer cycle. Embryos that show an abnormal result cannot be transferred. Embryos that have been biopsied cannot be transferred in the same cycle with embryos that have not been biopsied, or those that did not yield a result.

We are not allowed to carry out sex selection for social reasons. Sex selection can only be performed when there is a known risk of serious physical or mental illness or disability for one gender, when the other is unaffected. In this case, the unaffected gender will always be selected over an embryo of the affected gender.

4 FUNDING

Unfortunately at this stage the NHS does not routinely fund PGS. The Department of Health has issued "Guiding Principles for Commissioners of NHS Services for PGD" to inform Health Authorities about the benefits of the technique. The private cost of PGS is shown on our website is available on request from your doctor. This is in addition to the cost of the IVF treatment cycle and the cost of drugs.

5 SUCCESS RATES

We have to point out that PGS is a new technology and the information available is limited. Further studies are needed though to give us more accurate success rates.
Results from studies conducted so far would indicate that when using pregnancy rate per cycle started, PGTa does not improve outcomes. When using pregnancy rate per embryo transfer PGTa has been shown to improve pregnancy rate. WFI would certainly not recommend the routine use of PGTa as the evidence does not support this approach. To date no studies have been conducted whose primary focus is to investigate the effect of PGTa on miscarriage, however secondary evidence from other studies indicates that PGTa may reduce the incidence of miscarriage in patients older than 35. However this may be because embryos are not replaced rather than embryos being replaced and establishing ongoing pregnancies.

6 RISKS OF PGS

PGS is a relatively new procedure and an invasive technique. Some oocytes or embryos may not survive the biopsy process (less than 5%). However; the techniques of embryo biopsy have been in use for some years. Routine procedures used in standard IVF such as assisted hatching involve making an opening in the outer covering of the embryo and have not been shown to have any negative effect on embryo development.

Sadly, it is possible for all the embryos to be abnormal or we may not get a diagnosis for a particular embryo. In this case we may discuss with you the possibility of transferring these untested embryos. We have to point out that NGS is a new technology and the information available is limited. Further studies are needed though to give us more accurate success rates.

Routine IVF and PGTa cycles share some common risks such as no or few eggs being collected; poor or no fertilization; no or poor embryo development. In such cases there may no embryos to biopsy and the biopsy element of treatment may be cancelled. In certain circumstances it may be possible to transfer embryos without performing PGTa.

Additional risks associated with PGTa are that not every biopsy may yield a result. That there is a possibility of misdiagnosis, either false positive (normal embryo being regarded as abnormal) or false negative (abnormal embryo being regarded as normal), though this is low at around 5%. The technology also will not detect certain rare conditions such as uniparental disomy, where a chromosome has the correct number of copies (two), but both are derived from just one of the parents.

Embryos may also suffer from mosaicism whereby the biopsied sample contains both euploid (normal) and aneuploid (abnormal) cells in varying degrees. Transferring mosaic embryos may result in failed implantation, miscarriage and pregnancy with chromosomal abnormalities. A number of livebirths have been reported following transfer of mosaic embryos suggesting that embryos may be capable of self-correcting genetic errors. Due to limitations that are placed on describing mosaicism it is also possible that mosaic embryos may be discarded when they are capable of producing a normal pregnancy. Finally, PGTa does not guarantee a pregnancy or that miscarriage can be avoided and WFI always recommends patients considering PGTa to undertake routine prenatal testing.

Within the assisted reproduction field, PGTa is still a controversial technique with evidence both supporting and refuting its use in different circumstances. The HFEA designates PGTa as red on its traffic light system due to the lack of well designed randomized clinical trials (RCTs) supporting its use. We encourage patients considering PGTa to visit the HFEA website https://www.hfea.gov.uk/treatments/treatment-add-ons/pre-implantation-genetic-testing-for-aneuploidy-pgt-a/ to read about PGTa and other add-ons in general but also to read the paper presented at the June 2020 meeting of the HFEA scientific advisory committee relating the usefulness of PGTa https://www.hfea.gov.uk/media/3173/scaac-pgt-a-june-2020.pdf and the recommendations of an independent report commissioned by the HFEA about PGTa.

7 COUNSELLING

We appreciate that all of this can seem very complex and stressful. Many people who have difficulty in having children say that it is more distressing than any previous experience in their lives. Counselling can help you to share and explore difficult feelings, discover fresh ways of coping and reduce the stressful impact of treatment.
WFI's counselling service is available please contact reception to make an appointment.

8 FURTHER INFORMATION, DISCUSSION AND REFERRALS

For further information or discussion please contact your doctor.