PRE IMPLANTATION GENETIC TESTING (PGT) PATIENT INFORMATION

1 WHAT IS PREIMPLANTATION GENETIC TESTING?

Put simply, PGT is cover all term for investigating the genetic health of embryos prior to embryo transfer. There are 3 main types of PGT with each looking at different genetic information:

PGT-A (Pre-Implanatation Genetic Screening for Aneuploidies, formerly known as PGS) looks at the amount of genetic material within IVF embryos. Genetic material is housed within structures called chromosomes and having the correct number of chromosomes very important for healthy growth and development. Embryos with an incorrect number of chromosomes (known as aneuploid embryos) typically do not result in a successful pregnancy or may lead to the birth of a child with a genetic condition. Embryos with the correct number of chromosomes (known as euploid embryos) have a better chance of leading to a successful pregnancy. PGT-A identifies embryos with the correct number of chromosomes so the embryology team can select the embryo with the best chance of leading to IVF success.

PGT-SR (Pre-Implanatation Genetic Screening for Structural Rearrangements). Chromosomal rearrangements are changes from the normal size or arrangement of chromosomes, which are the structures that hold our genetic material. Embryos with chromosomal rearrangements often do not give rise to successful pregnancies. Patients may wish to consider PGT-SR if you had a child or pregnancy with a chromosome rearrangement or if you or your partner are a carrier of an Inversion; Reciprocal translocation or Robertsonian translocation.

PGT-M (Pre-Implanatation Genetic Screening for Monogenic/ Single gene disorders, formerly known as PGD). For people who know they are at increased risk of passing on a specific genetic condition. PGT-M tests are created uniquely for each family. PGT-M can be performed for nearly any single gene disorder as long as the specific familial gene mutation has been identified and appropriate family members are available for test preparation.

2 WHAT IS INVOLVED IN A PGT TREATMENT CYCLE?

PGT is an adjunct or add-on to a standard cycle of IVF/ ICSI. Whilst PGT-A can be performed without prior genetic information from the patients, PGT-SR and PGT-M require the patients to have seen a genetic counsellor and a diagnosis to have been made. For PGT-M, a specific test will need to be designed due to the unique nature of each genetic mutation. Once preparations are complete a standard IVF cycle is undertaken to produce embryos for testing. 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. Once the results are known we can arrange for you to start a frozen embryo transfer (FET) cycle and have the genetically normal embryos replaced.

3 HOW IS PGT PERFORMED?

PGT 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 cells that are removed from the embryos are analysed an external genetics testing 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

At present the NHS only funds PGT-A and PGT-SR where patients meet their criteria. WHSSC does not fund PGT-A. 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

Success rates for PGT are difficult o interpret due to the differing nature of the patients that access these technologies. PGT-M and PGT-SR is often used by pateints who are not necessarily infertile but who wish to prevent their children inheriting a genetic disease. As such, the success rates of PGT-M/ SR cycles can be very high indeed. PGT-A is a more controversial technique and may not increase pregnancy rates when looking from a per cycle started point of view. This maybe because 2 of the biggest risks when undertaking a PGT-A cycle are that there are no suitable embryos to biopsy or that all the embryos are found to be chromosomally abnormal. For this reason WFI does not advocate PGT-A for everyone. There is evidence however to suggest that PGT-A may be a useful tool in avoiding recurrent implantation failure or ecurrent miscarriage in older patients. We strongly suggest looking at the HFEA current information on genetic testing whilst considering you consider any embryo testing.

6 RISKS OF PGT

Although the use of PGT continues to increase worldwide there are still risks to be aware of at every point in the process.

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 PGT.

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.

Additional risks associated with PGT 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, PGT 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 "Gold Standard" 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.