

## FACTSHEET

### INTRA-CYTOPLASMIC SPERM INJECTION (ICSI) and SPERM RETRIEVAL TECHNIQUES

ICSI stands for Intra-Cytoplasmic Sperm Injection, and it was first successfully used in 1992, but has now been widely adopted around the world.

#### Who requires ICSI?

There are two main groups of patients that may require ICSI:

- (i) Patients who have a severe sperm problem.
- (ii) Patients who have previously attempted IVF but have failed to achieve fertilisation (generally on more than one occasion).

In group (i) patients can be further subdivided into routine and surgical.

#### Routine

In this classification we have patients with a low sperm count, poor motility (which means the sperm are not very active) or a high percentage (more than 95%) of sperm with “abnormal” shape (morphology). However, the majority of men have a combination of these problems. The presence of antibodies in semen can also reduce fertilisation rates as they affect the way in which sperm bind to the egg. Samples with very low sperm counts (fewer than 0.1 million per ml) can be ‘spun’ to collect all the sperm together before the ICSI procedure. Samples with no active (motile) sperm can be assessed to see if they have sperm which are alive and can be used for ICSI. Sperm with extremely poor morphology (where they appear abnormal) can struggle to penetrate the egg but that can be overcome with the ICSI procedure by selecting the most “normal” shaped sperm.

#### Surgical sperm recovery

Sperm can be recovered from the epididymis (a coiled tube at the back of the testicles) by inserting a needle through the skin, which does not require surgery. This procedure is called Percutaneous Epididymal Sperm Aspiration (PESA). Following a failed PESA, it is now possible to recover sperm directly from the testicle either by using a needle to aspirate the sperm (TESA - Testicular Sperm Aspiration), or by doing a biopsy of the tubes that actually manufacture the sperm (TESE - Testicular Sperm Extraction). If a mature sperm is obtained by any of these procedures, using ICSI means there is a chance to have a baby, even in the so called “impossible” situations.

#### Unexplained infertility

Some couples have been classified as having “unexplained” infertility because the tests available have not found a significant problem on the female side or with the sperm. If the eggs are not fertilised by the sperm when the fertility problems are unexplained, then ICSI may offer a solution.

## **The Procedure**

The ICSI procedure begins by first immobilising the sperm and stopping it moving. The sperm is then sucked up into a tiny needle. The egg itself is held onto another tiny tool by gentle suction to keep it firmly positioned. The needle containing the sperm is pushed gently up against the outer shell of the egg, then carefully pushed through the shell, through the outer membrane of the egg and directly into the centre of the egg itself.

Despite the tiny size of the egg (approximately seven times smaller than the average full stop), the membrane is a very elastic structure and can be extensively stretched without actually being ruptured (like poking a finger into a balloon). Once the embryologist is certain that the egg has been penetrated, the sperm is injected into the egg.

The egg is cultured overnight in an incubator at 37°C in conditions mimicking the womb. The subsequent procedures, checking for fertilisation, development of the fertilised egg and transfer of any embryos to the womb occurs in the same way as usual with IVF.

## **Safety**

The most recent review of current expert opinion and literature review concluded that there is no increased risk of birth defects in IVF/ICSI conceived children when compared with naturally conceived children. The review suggested that the main reason for differences in the health of ICSI/IVF conceived babies could be due to the age of the mother although long term studies must be continued to be performed to further assess the safety of ICSI conceived children<sup>1</sup>.

1- BCJM Fauser, P Devroey, K Diedrich, B Balaban, M Bonduelle, HA Delemarre-van de Waal, C Estella, D Ezcurra, JPM Geraedts, CM Howles, L Lerner-Geva, J Serna, D Wells, Evian Annual Reproduction (EVAR) Workshop Group 2011, Health outcomes of children born after IVF/ICSI: a review of current expert opinion and Literature, 2014, Reproductive BioMedicine Online (2014) 28, 162– 182.

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