

## Information for Patients

# Intra-Cytoplasmic Sperm Injection (ICSI)

### What is ICSI and why is it necessary?

Intra-cytoplasmic sperm injection (ICSI) refers to the technique of injecting a single sperm into the centre (cytoplasm) of the egg. In natural conception a large number of sperm surround the egg and many attach to the outside, but only one sperm penetrates and fertilises each egg. In standard IVF we mimic nature by adding a large number of sperm to the dish containing the egg. In ICSI the scientist selects sperm based on their activity and appearance. A single sperm is then injected into each mature egg using specialised equipment that allows the egg and sperm to be handled precisely.

### Which couples require ICSI?

ICSI is recommended in cases where there is a clear sperm problem, as otherwise there is a risk that the eggs may fail to fertilise. If a sperm problem is known of beforehand, we will usually advise that you undergo ICSI. If you are using surgically retrieved sperm, we will usually advise ICSI.

If there is no known sperm problem we advise standard IVF, as ICSI gives no benefit to such couples. However, sometimes on the day of egg collection the sperm sample is unexpectedly poor. If this happens, we will carry out ICSI to try to achieve fertilisation.

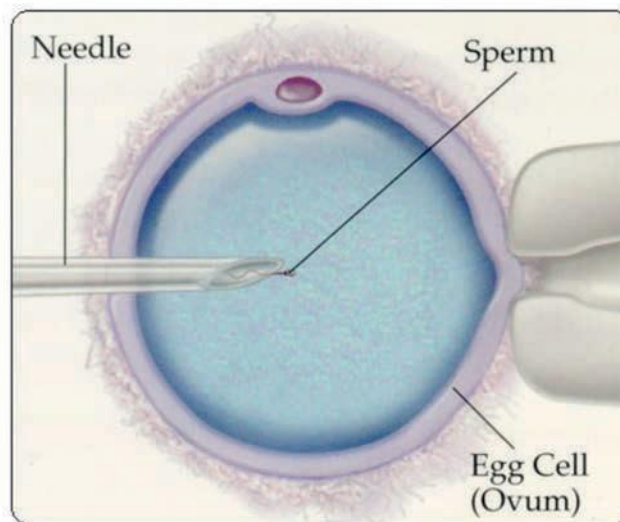
We may also recommend ICSI if you have had standard IVF and there was a very low fertilisation rate, or no fertilisation. This can happen occasionally, even if there is no obvious sperm problem. If this happens in your case, we will discuss the alternatives and whether ICSI is likely to help.

### How is ICSI carried out?

Except for the method of fertilisation, every other aspect of your treatment cycle is identical for ICSI and conventional IVF, including hormonal stimulation, egg recovery, producing the sperm sample and embryo replacement.

On the day of ICSI, the embryologist carefully removes the outer (cumulus) cells from each egg, using an enzyme normally produced by sperm. This enables the embryologist to see inside the egg using a high powered microscope and assess if the egg is 'mature'. All

eggs can be inseminated by IVF, but only mature eggs can be used in ICSI. In most treatment cycles, approximately 80% of eggs are mature. The sperm are prepared as normal for IVF. The embryologist then picks out individual live sperm, of normal appearance and injects one into each egg, using a special glass needle (see diagram below).



After ICSI the eggs are returned to the incubator overnight and checked for fertilisation the following morning, as for conventional IVF.

## How successful is ICSI?

Approximately 6 out of every 10 eggs will fertilise successfully by ICSI, similar to IVF. The reasons for ICSI fertilisation not being 100% successful include:

- Immature eggs cannot be injected.
- Some eggs may be damaged by the injection procedure. This appears to be related to the properties of the inner egg membrane.
- Even when injected directly into the egg, many sperm are not capable of 'activating' the egg.

Following successful fertilisation, embryo development is similar for ICSI and IVF.

Following embryo transfer, pregnancy rates are similar to IVF.

## What risks are associated with ICSI treatment?

ICSI offers the opportunity of success for couples who could not achieve it otherwise. However, it does carry some additional risks over and above those of IVF treatment in general.

It is known that abnormal sperm production, as is the case in men with very low sperm count or absent sperm in the ejaculate, can be associated with genetic defects in the male. As ICSI bypasses the normal processes of sperm 'selection' and fertilisation, these genetic defects may be transmitted to the children.

It is also possible that the egg may be damaged by the injection procedure. Theoretically, this can result in damage to the resulting embryo if the damaged egg is fertilised normally.

In 2005, a major European review of children born after ICSI and IVF (followed up until 5 years of age) found that so-called major birth defects involving the heart, lungs, musculoskeletal or gastrointestinal systems, were present in about 2% of naturally conceived offspring, 4% of children conceived by routine IVF, and in 6% of children conceived after ICSI. A substantial proportion of the abnormalities in the ICSI children were problems in the development of the urinary or genital organs, especially in boys. However, all of them were correctable by surgery and they were found to be caused by genetic factors from the father, rather than a result of the ICSI procedure itself.

Minor birth defects were present in about 20% of naturally conceived offspring, 31% of children conceived by routine IVF, and in 29% of children conceived after ICSI. Minor anomalies are those which do not in themselves have serious medical, functional or cosmetic consequences for the child. More recent studies reported no difference in the risk for any anomaly or specific anomalies after different types of IVF technologies including ICSI.

It should be borne in mind that the great majority of babies born by ICSI do not display any abnormalities