



## Pulse-Driven ICSI (Intracytoplasmic Sperm Injection)

ICSI is a technique to inject a single sperm directly into the cytoplasm of the egg. Here at Alpha IVF Singapore, we use pulse-driven ICSI as our method of choice for fertilisation. Embryologists in the Alpha IVF Group have used this technology since 2014.

### What is Pulse-driven ICSI?

Compared to conventional ICSI, pulse-driven ICSI uses piezoelectric pulses to aid in the injection of a sperm into the egg. This technique uses a blunt pipette tip instead of a sharp one. In this way, the eggs are handled gently reducing the risk of injury. The sperm is released into the egg cytoplasm more readily and securely, optimising egg fertilisation.

A study demonstrated that this ICSI technique achieves high fertilisation rate (90%) and low egg degeneration rate (1%) which is consistent with our experience [1].

### How does it work?

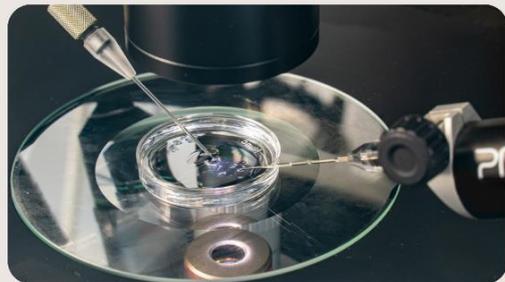
In pulse-driven ICSI, external voltage is applied to the piezo-elements in the drive unit which produces an ultra-fast forward momentum (vibration) at the pipette tip.

These piezoelectric pulses give rise to vibrations, that assist in sperm immobilisation, penetration of the egg's shell and puncture of the membrane during the injection process.



#### WORKFLOW

- Select a healthy-looking sperm
- Immobilise sperm by applying piezoelectric pulses
- Penetrate egg's shell with piezoelectric pulses
- Advance needle into the egg's membrane
- Apply one piezoelectric pulse to puncture the egg's membrane
- Release sperm into the egg





### Pulse-driven ICSI (Diagram)



- A. A blunt pipette is gently advanced through the egg's shell by applying piezoelectric pulses.
- B. Once positioned inside the egg, one piezoelectric pulse is applied to break the membrane.
- C. The sperm is released before removal of the pipette.

### Conventional ICSI (Diagram)



- A. A sharp pipette is forcefully advanced into the egg's shell and membrane, 'squeezing' the egg temporarily.
- B. The egg cytoplasm is aspirated into the pipette to break the membrane.
- C. The cytoplasm contents and sperm are released before removal of the pipette.

### Is it safe?

Several studies have demonstrated that this ICSI technique is less invasive than conventional ICSI, thereby reducing potential damage to the eggs [2][3][4][5]. More importantly, there was no significant difference in the health of the baby (gestational age, birth weight, congenital abnormality) conceived from embryos between the two groups [5].



### Benefits of Pulse-driven ICSI

Gentler handling of eggs compared with conventional ICSI:

- No deformation of egg during injection
- Lower degeneration of eggs

Insertion of sperm into the egg is done readily and securely:

- Piezoelectric pulse is used to break the egg membrane
- No need to aspirate the cytoplasm contents

All the above help to increase fertilisation rate of eggs to yield a better outcome of pregnancy for the couple. By using this technology, it saves time and emotional pain and money for the couple from having to repeat the process many times over compared to using conventional ICSI.

### References

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