fertilityplus
Te Korito

IVF Treatment Information

www.fertilityplus.co.nz

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Introduction

Fertility Plus is proud to have been at the forefront of fertility treatment in New Zealand for the past 40 years. The first IVF cycle in New Zealand occurred in July 1983, with the first IVF pregnancy occurring soon after. Since that first IVF cycle, Fertility Plus has been leading IVF treatment in New Zealand and advances in research and evidence-based care.

By being part of Te Toka Tumai, Auckland/Tāmaki Makaurau, Fertility Plus is able to access a wide range of clinicians with expertise in gynaecology surgery, endocrinology and pregnancy. Our services are integrated with the general gynaecology, maternity and medical services, ensuring that we can support all aspects of your fertility treatment and ongoing care. Te Toka Tumai is the Māori name for the Auckland region of Te Whatu Ora: Health New Zealand. It refers to the rock that stands firm in the sea of the Waitemata harbour of Tamaki Makaurau (Auckland).

The team at Fertility Plus aims to provide accessible fertility treatment with integrity and compassion. The team-based approach includes specialist fertility doctors and nurses, embryologists, counsellors and administration staff, who work together to provide you with comprehensive fertility treatment.

Fertility Plus works within the values of Te Toka Tumai Auckland. Values are not only about what we do but, how we do it and how that makes our staff and our patients feel. When we are at our best we provide a great experience for our patients and their whānau. Our shared values will guide the way we all work and help us to make values-led decisions and prioritise what we do in the future.

Haere Mai

We see you, we welcome you as a person.

Manaaki

We respect, nurture and care for each other.

Tūhono

Together we are a high-performing team — colleagues, patients and whānau.

Angamua

We aim high and aspire to excellence and the safest care.

Emergency Care

For emergencies outside the clinic hours please contact the
Women's Assessment Unit at Auckland City Hospital on **09 631 0784**

Safety and Quality

Fertility Plus works to ensure that services of the highest quality are provided, whist prioritising patient safety and confidentiality. The service undertakes annual accreditation audits and data submissions to monitor and validate the provision of fertility treatment. All patient information used is treated with the strictest confidence, and auditors must sign a confidentiality agreement to protect your privacy.

Fertility Plus demonstrates compliance with:

- The Reproductive Technology Accreditation Committee (RTAC), who sets standards for fertility treatment in Australia and New Zealand.
- the Human Assisted Reproductive Technology (HART) Act 2004
- Fertility Standards 8181, as determined by a designated accrediting agency (DAA) who inspects Fertility Plus annually.

Pregnancy and IVF cycle data must also be sent to the Australia and New Zealand Assisted Reproduction (ANZARD) database for audit purposes, administered by the National Perinatal Statistics Unit (NPSU) Each record must be identified using an NHI number; no patient names are recorded.

Fertility Plus Team

There is a multidisciplinary team of staff at Fertility Plus who will care for you and co-ordinate your IVF treatment. By providing team based care, a collaborative approach can be used to provide you with the best expertise and knowledge. For both public and private patients, you will be allocated a primary doctor to oversee your treatment and see you for your consultations. One of the team of doctors will see you at your procedure appointments such as scans, egg collection and embryo transfer.

The team at Fertility Plus comprises of:

- Medical Director, Consultants and Registrars
- Charge Nurse and Nurses
- Scientific Director and Embryologists
- Counsellors
- Administration Staff

Nurses: our nursing team is available by telephone (09) 630 9810 extension 3 for treatment bookings, instructions and blood results daily from 8.00 am – 4.30 p.m. There is a voice-mail service, so please leave a message and your call will be returned as soon as possible.

The nurses will respond to an urgent message by the end of the day. Day one calls (09) 630 9810 extension 2 are considered non urgent and will be responded to in time for you to begin your treatment. On the day of a blood test, you will be called in the afternoon with your results and instructions.

Embryologists: our laboratory team provides all procedures involving embryology (the culture of eggs and embryos) and andrology (semen analysis and preparation). If you need to make an appointment for a semen analysis or have any questions regarding eggs, sperm or embryos you can phone the laboratory directly on (09) 630 9842.

Counsellors: Our counsellors are available between 7am and 3 30pm Monday to Friday. In addition to this the counsellors do offer some late appointments, so please get in touch and we will endeavour to accommodate your needs. You're welcome to speak to them by calling (09) 6309810 extension 6. There is a voice-mail service, so please leave a message if the counsellors are unable to take your call straight away. Appointments can be made as individuals or as a couple, and you are welcome to bring a support person along. Appointments can be either in person or by phone or Zoom depending on the type of appointment.

Support

Whilst you are undergoing treatment at Fertility Plus, you are welcome to have your partner, family/whānau, or friends accompany you to appointments and procedures.

A chaplaincy service is offered by Te Toka Tumai for all denominations. This is confidential and can be accessed at any stage of your treatment. A prayer or karakia can be performed. Please discuss this with one of the counsellors or nurses if you wish for this to be arranged.

Te Toka Tumai aims to ensure that patients/consumers receive services in a manner that recognises their cultural and individual beliefs and values. Fertility Plus ensures that Māori are supported to continue their cultural and traditional practices while receiving fertility services. We are supportive of whānau, hapū and iwi involvement in treatment, support, care plan and review.

In addition, there are infertility support groups throughout New Zealand. These organisations offer information and support for people experiencing infertility.

Fertility NZ	Endometriosis NZ
💻 www.fertilitynz.org.nz	💻 www.nzendo.org.nz
📞 0800 333 306	📞 03 379 7959
✉ support@fertilitynz.org.nz	

Compliments and Complaints

If you have a compliment or a concern about a service or care that you or a family member received at Fertility Plus or Te Toka Tumai Auckland, please let us know. We welcome all constructive feedback because which enables us to continually improve our services and share positive stories with staff. You can either speak to those providing your care, or the Charge Nurse at Fertility Plus.

If you feel uncomfortable talking to these people, or you have a concern and aren't satisfied with their response, please contact our Consumer Liaison Team:

✉ feedback@adhb.govt.nz

✆ 09 375 7048

🖃 Consumer Liaison Team, Te Toka Tumai Auckland, Private Bag 92024, Auckland Mail Centre, Auckland 1142

If you are not happy with how your complaint was handled, you can also contact the Health and Disability Commissioner on ✆ 0800 112 233

Health and Disability Advocacy

The Health and Disability Advocacy Service provides free and independent health and disability advocacy to ensure that the rights of people are respected. They help consumers to resolve complaints about health or disability services. They operate independently of government agencies, the Health and Disability Commissioner, and the funders of health and disability services.

Advocates aren't investigators or mediators, nor do they make decisions on whether there has been a breach of the Code - they're there to support you, encourage you to take action (including making a complaint) and to help you resolve your concerns.

You can contact an advocate by free phone or by email:

✆ 0800 555 050
✉ advocacy@advocacy.org.nz

Or use the list of Advocacy Service offices and phone numbers below to find an advocate in your area:

- Kaitaia: (09) 408 0006
- Whangarei: (09) 430 0166
- North Shore: (09) 441 9001
- Auckland Central: (09) 525 2700
- West Auckland: (09) 838 8068
- South Auckland: (09) 273 9549

Counselling Service

All accredited Fertility Clinics are required to offer access to a counselling service. A counsellor is available for anyone undergoing Fertility treatment at Fertility Plus at any stage of treatment.

Why we offer counselling

Infertility can be emotionally very demanding. It can affect every aspect of your life. You may feel isolated from your family and friends and find that you experience a whole range of emotions. Often people describe feeling that they are on an "emotional roller coaster", with some exciting and hopeful times, but also disappointments and losses. Our counsellors acknowledge the often difficult journey of fertility uncertainty and the importance of offering support during treatment.

What our counsellors offer

We recognise that there are many factors that impact on your decisions about treatment and your experience of it. In counselling, we take the time to understand your concerns along with the emotional and social aspects of treatment that affect you. Counselling gives you a chance to clarify information and to focus on how you are feeling and what you need. This can help you make decisions that are right for you. Most importantly, counselling provides you with a source of support and strategies to help cope and build resilience for your journey.

You may meet with a counsellor if you are coming to the clinic for an IVF orientation. Counselling is mandatory for all fertility treatment involving donor eggs, sperm or embryos, and surrogacy.

If you are needing support afterhours or during the weekend, free call or text 1737 any time to receive support from a trained counsellor.

If you are needing urgent care, please contact Lifeline on 0800 543 354 (0800 LIFELINE) or free text 4357 (HELP).

Do leave a voicemail on the counsellors' line and we will get back to you as soon as is possible during office hours.

Cost

Fertility Plus public patients do not pay an additional fee for counselling. Fertility Plus private patients have up to two counselling sessions included in their fees when undergoing IVF and one session with IUI treatment. Subsequent sessions for private patients will cost $140.00 per one-hour session. Fertility Plus private patients involved in a donor or surrogacy programme will be advised separately of the counselling costs.

Sometimes the doctor, nurse or embryologists may ask the counsellors to contact you if they think some additional support might be helpful, or they may suggest that you contact the counsellors to talk through issues and decisions. The counsellors are available to see people individually, with their partner or other support person, or they are available for phone consultations.

If you have any concerns or issues you may wish to discuss you can arrange an appointment with a counsellor by phoning (09) 630 9810 extension 6.

Family Violence

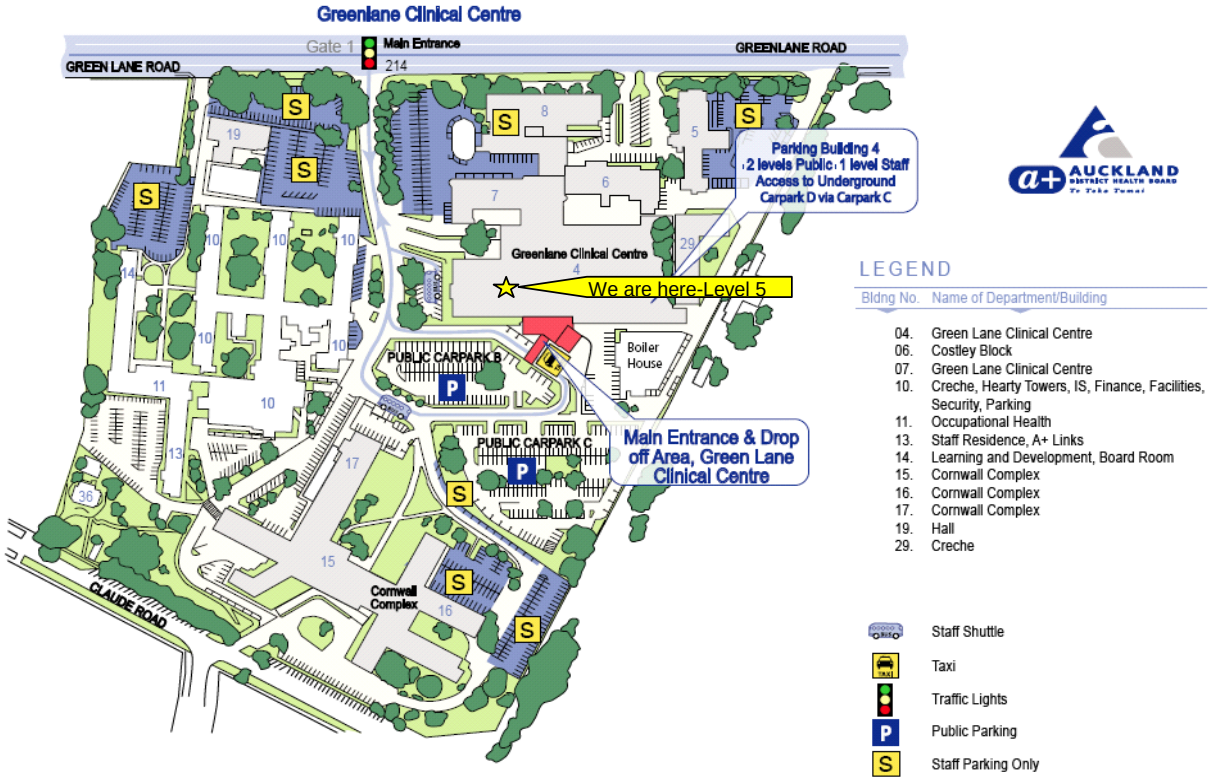
Fertility Plus is committed to helping those affected by family violence. You may be asked routine screening questions about this during your appointments as your health and safety is our paramount concern. Please speak to a Fertility Plus staff member if family violence is a concern for you. You can also phone the helpline on 0508 744 633. You are not alone – there is support available.

Location

Fertility Plus is located at:

Level 5, Building 4, Greenlane Clinical Centre, 214 Greenlane Road West, Epsom.

Use the main entrance (Gate 1) to the Greenlane Clinical Centre opposite Alexandra Racecourse. Once inside the main entrance to Building 4, continue past the Pharmacy to lifts A. Fertility Plus is located on level 5.



Fertility Plus Hours

The clinic is open between 7.30 am - 4.30 pm Monday to Friday and 9:00am – 2.00pm on weekends. The clinic will provide care on public holidays as required; however the clinic will close between Christmas and the New Year holidays.

Website

For additional information, please refer to the Fertility Plus website:
www.fertilityplus.co.nz

Funding Treatment

Public Treatment

Fertility Plus is New Zealand's only fertility service located within a public hospital. Improving the health of the Auckland population and all New Zealanders who access our services is the foundation of the work undertaken at Te Toka Tumai.

Working out your eligibility

In order to be eligible for publicly funded fertility treatment, you will be scored against a Clinical Priority Assessment Criteria (CPAC) system. If you gain 65 points or more (out of 100 points) you are eligible for publicly funded fertility treatment. A fertility specialist will calculate your CPAC score and offer you the opportunity to enroll for publicly funded treatment if you are eligible.

The scoring system takes into account your:

- chance of pregnancy without treatment,
- chance of pregnancy with treatment,
- diagnosis affecting fertility such as severe endometriosis, very low sperm counts, blocked fallopian tubes,
- how long you have been trying to get pregnant,
- whether you have children living at home, and
- whether you have had a tubal ligation or vasectomy.

To be eligible for public funding, at the time of referral the woman has to be:	To be eligible for public funding, the man needs to be:
• 39 years old or under, • a non- smoker and • with a BMI less than or equal to 32.	• 54 years old or under, • a non-smoker and • with a BMI less than or equal to 40.

Eligibility for publicly funded treatment also requires both partners to be New Zealand citizens or residents, or a work visa for the required duration.

Public funding provides up to 'two packages of treatment'. A single package is of one of the following:

- one cycle of IVF treatment (including ICSI, donor egg, or surrogacy) and the use of any frozen embryos arising from that treatment, OR
- four cycles of IUI treatment using partner or donor sperm, or ovulation induction using FSH medications, OR
- microsurgery on the fallopian tubes or testes if that is more appropriate than IVF, OR
- thaw cycles using frozen embryos from a privately funded treatment cycle

Cycle completion
A cycle is considered complete if there was an embryo to transfer or freeze in an IVF cycle, or insemination takes place in an IUI cycle. If the treatment cycle is stopped before this stage, we may offer a second attempt as part of the same package. For PGT a cycle is considered complete if there is an embryo suitable for testing.

Full package of care
A package of care covers the IVF cycle and frozen embryo replacements until two live births are achieved, thereafter any further frozen embryos incur privately funded fees.

Stored embryos
When a person has stored embryos (from a previous public or private IVF cycle), these embryos must be used, before a further publicly funded IVF cycle is initiated (if required).

Public Funding Eligibility

Please be aware that in order to receive public funding for fertility treatment you must continue to meet the eligibility criteria prior to, and during, the course of treatment.

This means that you must maintain a healthy weight and BMI of 18-32, be a non-smoker, and meet residency requirements.

Please note for PGT treatment there are additional criteria for second cycles.

Will I be eligible for a second public cycle?

A couple is eligible for a second cycle of treatment if they were unsuccessful in their first package of publicly funded treatment and their CPAC score remains ≥65 points at the time of enrolment for a second cycle.

Other criteria must also be met including:

- remaining a non-smoker for both partners,
- being aged under 40 years for women and under 55 years for men,
- BMI less than or equal to 32 for women and less than or equal to 40 for men, and
- New Zealand residency for both partners or a work visa for the required duration.

All frozen embryos must be transferred from the first package of care before a second package of care can commence.

PGT Treatments: In addition, because the presence of a genetic disorder reduces the number of embryos likely to be available, ovarian reserve should be sufficient to expect six eggs or more when there is a monogenic condition, and ten eggs or more when there is a chromosomal rearrangement.

Private Cycles

Fertility Plus prides itself on providing patients with accessible treatment options. This includes being the most affordable option in the Auckland region for treatment.

Patients may choose to access private treatment for a number for reasons;

- they may wish to undertake treatment whilst on the public waitlist,
- they may be ineligible for public fertility treatment,
- they may have completed their publicly funded treatment or wish to access treatment that is in addition to that provided by public funding.

Please be aware that private treatment must be paid in full prior to egg collection. If you would like to set up a payment plan, please speak to us about this option.

Please contact the clinic on **0800 333 306** if you wish to discuss options for privately funded treatment.

Pre-treatment Advice

Maximize your chances of conception by becoming aware of factors effecting your fertility.

There are some important changes that you may wish to make to maximise your chances of getting pregnant. Research has suggested that the factors listed below may have an effect on conception and the outcome of treatment.

Body weight

Women who are overweight or underweight are less likely to conceive following most forms of infertility treatment, particularly IVF. This is reflected in the Ministry of Health's eligibility criteria for accessing publicly funded fertility treatment, which is only available to women with a body mass index (BMI) of 32 or less. There is also increasing evidence that male obesity is associated with reduced sperm concentration and motility so it is recommended that male partners also achieve and maintain a healthy BMI.

Being overweight during pregnancy also increases your chances of having a baby with a congenital abnormality, developing diabetes or pre-eclampsia, and requiring a caesarean section birth.

The most effective lifestyle change you can make to improve your chances of conception and having a healthy baby is maintaining a healthy body weight. A BMI of 20 to 25 is ideal.

Smoking, Alcohol and Recreational Drugs

Smoking and alcohol are discouraged for both men and women. There is evidence to suggest that smoking and alcohol reduce sperm quality and numbers, and embryo implantation can also be affected. Smoking in pregnancy can increase the risk of ectopic pregnancy, miscarriage, haemorrhage, low birth weight babies and premature labour.

People who smoke or vape are not eligible for public funding; both partners need to have stopped for three months before becoming eligible and remain non-smoking status throughout the course of treatment. It is strongly recommended that private patients who smoke should consider giving this up. If you stop smoking, you can improve your chances of conception and having a healthy child. Nicotine patches are not recommended because they may mimic the biological effects of smoking.

We can refer you to a smoke cessation programme if you require support.

The use of marijuana and other recreational drugs should also be avoided if you are planning to become pregnant. Marijuana has a detrimental effect on sperm quality.

There is little evidence that occasional or moderate alcohol consumption reduces fertility in either partner, but higher levels of alcohol consumption can have detrimental effects. We encourage women not to drink alcohol if they are trying to conceive. Any alcohol consumption is harmful in pregnancy.

Caffeine Intake

It is recommended that any women experiencing infertility should limit their intake of caffeine to 100-130mg daily. The amount of caffeine in one cup of coffee is about 100mg. Tea, chocolate and some medications also contain caffeine. Decaffeinated coffee should also be restricted, as the chemicals used in the process are also potentially harmful. Substances containing tannin such as tea and red wine should also be limited.

Stress

People cope with the disappointment of infertility and stress of treatment differently. To help you with the stress of fertility treatment, some people find it helpful to use relaxation techniques such as mindfulness, yoga, gentle walking and listening to relaxation tapes. Working on strategies to reduce stress during infertility is about helping you to manage your journey as best you can rather than suggesting you can control the pregnancy outcome by reducing stress. Self- care and compassion are key elements in managing the roller coaster of emotions and experiences. The counsellors are available before, during and after your treatment if you wish to talk to someone for extra support or learn some new coping strategies.

Medication

Some medications can affect the reproductive system of men and women such as medication for epilepsy, hay fever, gout, gastric and blood pressure disorders, steroids, and antibiotics. Please discuss with your doctor if you have any concerns regarding the medication you are taking, this includes vitamins and herbal supplements.

Folic acid and Iodine intake

Research over the last 30 years has suggested a relationship between maternal diet and the occurrence of neural tube defects in babies. Neural tube defects (spina bifida, anencephaly and encephalocele) result from defective closing of the neural tube in early pregnancy. The neural tube is the embryological structure from which the brain and spinal cord develops. It closes around the 27th day post-fertilisation. Recent studies on the effect of vitamin supplements in women planning a pregnancy have found that folic acid can considerably reduce, though not entirely eliminate, the chance of neural tube defects.

Folic acid is a water-soluble vitamin found in many fruits (particularly oranges, berries and bananas), leafy green vegetables, cereals and legumes. It can also be taken in tablet form. The recommended dose is 0.8 milligrams per day. You should be taking folic acid two months before the possibility of becoming pregnant i.e., one month prior to treatment, through to 12 weeks after becoming pregnant. If there is a possibility of pregnancy occurring naturally you should begin taking folic acid.

Iodine supplements are recommended from the confirmation of pregnancy onwards. Iodine is essential for healthy brain development and foetal growth. Many New Zealanders have a diet mildly deficient in iodine. The recommended dose is 150 micrograms (0.150 milligrams) per day. Iodine supplements should be continued right through your pregnancy.

Both folic acid and iodine supplements are available over the counter at any chemist. We can also provide you with a prescription.

Androgens (DHEA and testosterone)

Androgens are important in ovarian physiology and follicular growth. It is thought that androgen supplementation may improve ovarian response to stimulation during IVF. In women identified as poor responders, either as a consequence of premature ovarian aging or age, undergoing IVF treatment, pre-treatment with DHEA or testosterone patches may increase ovarian response and may be associated with improved live birth rates. However, the overall quality of evidence is low. DHEA can interfere with hormone assay performance, and hormone blood tests are required as a form of monitoring during IVF treatment. It is therefore important that you inform your doctor if you take DHEA

supplementation and that it is stopped when IVF treatment is commenced.

Antioxidant supplementation

Antioxidants are sometimes taken by couples trying to conceive. Examples are N-acetyl-cysteine; coenzyme Q10 (ubiquinol); melatonin; carnitines, vitamins A, C and E; myo-inositol; zinc and selenium. There is some evidence to suggest that the use of antioxidants in men undergoing IVF or ICSI is associated with increased live birth rates. For women taking antioxidants while undergoing IVF, there is low quality evidence suggesting an increase in pregnancy rates but not live birth rates. Studies looking at the use of antioxidants have not shown any evidence of harm from their use.

Antioxidant supplements are not available as funded medications, and can be purchased directly from the pharmacy if couples wish to take them.

Reproductive immunology

There are a variety of treatments which have been proposed to enhance implantation during IVF. Some examples are:

- Intralipid
- Aspirin
- Heparin
- Steroids
- Combinations of medications e.g., Bondi protocol, Colorado protocol

There is limited or no evidence of benefit, and possible evidence of harm with using these treatments. Therefore, we do not offer these treatments through Fertility Plus. You may discuss this further with your fertility doctor.

Complementary therapies

Many people wanting to become pregnant try complementary therapies such as Chinese herbs, aromatherapy, naturopathy, and acupuncture. Most alternative treatments have not been tested scientifically for their effects on hormones, sperm, eggs or embryos, or the uterus. Some studies have shown that particular herbs inhibit sperm and egg function. Please tell us if you are using complementary therapies.

Zika Virus

Zika virus disease is caused by a virus transmitted primarily by *Aedes* mosquitoes. People with Zika virus disease can have symptoms including mild fever, skin rash, conjunctivitis, muscle and joint pain, malaise or headache. These symptoms normally last for two to seven days. Cases of Zika virus have been reported in Africa, southern Asia, the Pacific Islands, throughout the tropical and sub-tropical areas of the western hemisphere, and as far north as the USA, Mexico and Puerto Rico.

There are concerns that pregnant women who become infected with Zika virus can transmit the disease to their unborn babies, with potentially serious consequences. Zika virus infection is known to be a cause of microcephaly and other serious brain anomalies in developing foetuses.

The New Zealand Ministry of Health recommends that women who are pregnant or plan to become pregnant in the near term should defer travel to areas with Zika virus present. If travel is essential, we recommend delaying pregnancy when travelling to these affected countries.

There is growing information available about the risk of sexual transmission of Zika virus. There is only limited evidence available at this time about how long men should abstain from sex or use condoms. Initial research has found Zika virus present in semen at least two months after infection develops. However, we do not know exactly how long the virus remains in semen. Until more information on

the duration of sexual transmission becomes available, men should use condoms or abstain from sexual activity (oral, vaginal, or anal) for at least six months after leaving a Zika-affected area.

The Ministry of Health website regularly updates as more information on Zika becomes available, and we recommend checking their site when considering overseas travel: http://www.health.govt.nz/your-health/conditions-and-treatments/diseases-and-illnesses/zika-virus

Male partner's role

Male partners are recommended to achieve and maintain a healthy weight, be a non-smoker, limit alcohol intake, avoid hot baths and spas, wear loose underwear, and avoid working with a laptop on your thighs. Current research also indicates that sperm health is improved by frequent ejaculation (every 48-72 hours). Long periods without ejaculation (abstinence) may have a negative effect on sperm DNA and thus result in poor embryo quality after fertilisation. There is some limited evidence that it may be helpful for the man to take a supplement of antioxidants e.g., Menevit.

The male partner is recommended to abstain from ejaculation or sexual intercourse for two to three days prior to treatment.

Some partners feel there is not much they can do to help during the cycle. Feedback from couples that have been through IVF suggest that practical and emotional support is incredibly valuable during this time. Our counsellors can explore this further with you if you wish.

Sperm DNA damage

Some degree of DNA fragmentation in a semen sample is normal. This DNA damage is primarily caused by 'Reactive Oxygen Species' or ROS which are a natural by-product of cell function. However, levels of ROS can increase during times of environmental stress or inflammation and can lead to high levels of DNA damage. A high level of DNA fragmentation can be associated with a number of factors such as poor diet, smoking, and exposure to environmental toxins, infections of the genital tract or defective packaging of DNA during sperm production. There may also be a genetic cause for high levels of DNA fragmentation.

Until the third day of development the quality of an embryo is predominantly determined by the egg quality. Sperm DNA contributes to embryo development after the third day. Fertilisation of eggs by sperm which have fragmented DNA or abnormal chromosomes can result in poor blastocyst development. This in turn can lead to decreased implantation rates, lower pregnancy rates and increased risk of recurrent pregnancy loss.

Sperm Chromatin Structure Assay (SCSA) is a specialised test which is used to assess the degree of DNA fragmentation within the sperm head. Studies have shown that patients with more than 30% of sperm cells with DNA fragmentation are more likely to have reduced fertility.

SCSA testing is not performed routinely, your doctor will recommend it if necessary. This test is performed before treatment starts, results take approximately three weeks. SCSA is not covered by public funding.

Treatment Add-Ons

These are the adjuvant therapies that Fertility Plus currently offers. Please speak to your doctor if you would like more information on the effectiveness, the risks and the cost of the Add-On. If you wish to have an add-on to your treatment you will be required to do a consent form for this with the doctor. Please note that at Fertility Plus we transfer every embryo in Embryo Glue.

- Pre-implantation Genetic Testing for Aneuploidy (PGT-A)
- Artificial Egg Activation
- DHEA
- Testosterone
- CoQ10
- hCG Infusion

Reproductive Genetic Carrier Screening

Genetic carrier screening gives individuals and couples information about their chance of having a child with a genetic condition. A test called Prepair 3 can tell you if you are a carrier of three common inherited conditions:

- **Cystic fibrosis (CF)** – is an inherited condition affecting breathing and digestion.
- **Fragile X syndrome (FXS)** – is the most common cause of inherited intellectual disability. People with FXS can have developmental delay, learning difficulties, anxiety, autism and epilepsy.
- **Spinal muscular atrophy (SMA)** – is a condition that affects nerves in the spinal cord and causes muscles to get weaker.

Genetic conditions are caused by changes in genes, which provide the instructions for our bodies. Prepair looks for the most common gene changes associated with CF, FXS and SMA in children. It will identify about 90% of people who are carriers of CF, 95% of people who are carriers of SMA and over 99% of people who are carriers of FXS.

If your test shows that you have one copy of the gene for CF or SMA, you are a carrier of this condition. Babies inherit one copy of each gene from each parent; therefore, a couple can only have a child with CF or SMA if **both** parents are carriers of the condition. Two people who are carriers of the same condition have a 1 in 4 (25%) chance of having a child with the condition for each pregnancy.

For FXS, only women who carry a gene of increased size have a greater chance of having a child with FXS. This means that your partner will not need to be tested for FXS. Female carriers of FXS have a 1 in 2 (50%) chance of passing the gene onto each child they have.

Prepair 3 detects the majority of carriers, but it cannot detect every gene change that causes CF, FXS and SMA. If no gene change is found it means that you are not a carrier of the most common gene changes, there is still a small chance for each condition that you are a carrier of rarer gene changes.

Genetic Carrier Screening is not performed routinely; it is optional. The test is performed before treatment starts and results take approximately two weeks. Prepair 3 will tell you if you are a carrier of CF, FXS or SMA. There are more detailed genetic carrier screening tests available that test for a much wider range of genetic conditions and these are called expanded carrier screening tests. There are several providers of such tests, one of which is Prepair. Expanded carrier screening tests for

hundreds of genetic conditions and there is the option of being screened as individuals or as a couple.

Genetic Carrier Screening is not covered by public funding. Please speak to us if you are interested in having a test prior to treatment and have any questions.

Getting Started

Before starting IVF treatment, you will be invited to attend an orientation session. The orientation appointment is an opportunity for you to gain an understanding of the processes involved in fertility treatment. If you are accessing fertility treatment as a couple, it is essential that you both attend this appointment. Prior to your orientation appointment you will be sent an information package and requisition forms for any outstanding tests that you may need to do before commencing treatment.

Your orientation appointment is linked to the commencement of your treatment month. Please advise us immediately if you are unable to undertake treatment in this scheduled month; your orientation appointment and treatment month will be adjusted accordingly.

Treatment consent forms

Consent forms for your treatment are included in your information pack and are usually signed at the time of your orientation. Both partners need to be present.

The consent forms that you will be required to sign are:

- Consent to procedures involved in IVF treatment including ICSI (if applicable) and embryo thawing: to be signed by both partners.

These consent forms are to be completed and signed in the presence of one of the Fertility Plus clinical staff members. Your consent form is valid for six months from the date of signing.

Please advise us if the status of your relationship changes, as you may need to amend your consent forms for IVF treatment cycles and further frozen embryo replacement cycles.

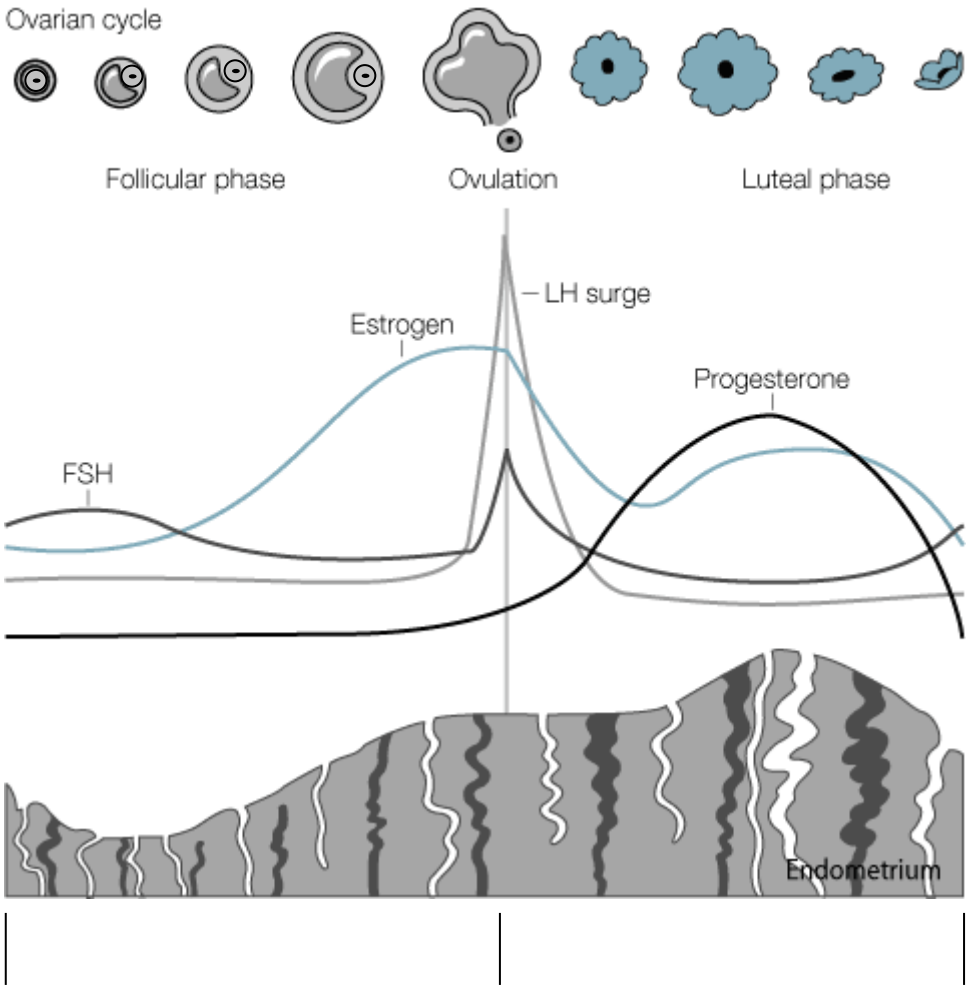
A further consent form is required to be signed by the person undergoing egg collection on the day of the procedure.

Menstrual Cycle

In order to understand how an IVF treatment cycle works, it is helpful to review what happens in a natural monthly menstrual cycle.

Please refer to the glossary at the back of this booklet to familiarise yourself with the medical terms used in this booklet.

Diagram of the menstrual cycle



This diagram depicts the menstrual cycle showing the ovarian, hormone and endometrial profile over a 28-day menstrual cycle. The ovarian cycle illustrates the development of a follicle with an egg maturing inside.

The menstrual cycle refers to the physiological changes which occur on a monthly basis in response to a pattern of changing levels of reproductive hormones.

There are two important groups of hormones:

- Gonadotrophins: Luteinising Hormone (LH) and Follicle Stimulating Hormone (FSH), which are produced and released by the pituitary gland in the brain
- Ovarian hormones: Estrogens and Progesterone.

The menstrual cycle is counted from the first day of a full fresh bleed (day one). The length of a woman's cycle is on average 28 days, however some woman experience shorter or longer cycles. The menstrual cycle is divided into two phases, the follicular phase and the luteal phase.

Follicular Phase

This is the first phase of the menstrual cycle starting from day one to day 14. During this phase egg development is stimulated and a mature egg is ovulated. The lining of the uterus is also stimulated to reconstruct and thicken after the last menstrual period.

An egg (oocyte) develops within the ovary in a follicle. The follicle grows in size as the egg develops and matures.

Each month, a group of immature eggs are recruited to begin growing in a separate process called folliculogenesis. The eggs growing inside follicles can develop to a certain stage independent of reproductive hormones; however these hormones become essential in order for an egg to survive and develop to maturity.

The pituitary gland in the brain begins the menstrual cycle by releasing FSH which initiates a response in the ovaries. Under the influence of this hormone a group of follicles is stimulated to continue growing and maturing. Only enough FSH is produced to allow one 'dominant' follicle to grow to full maturity, the rest will stop growing. When the follicle is mature and ready to be ovulated it is approximately 20 - 25mm in diameter. The egg itself is less than the size of a pinhead and is only just visible to the naked eye.

As the follicle matures it secretes increasing amounts of estradiol (E2). This hormone has two functions. Firstly, it initiates the growth of a new endometrium (lining of the uterus) after the last period. Secondly, when the E2 reaches a certain level (indicating follicle/egg maturity) it initiates the rise in LH. The release of the egg from the follicle will occur approximately 36 hours later and this is called ovulation (typically around day 14).

The egg is released from the ovary and enters the fallopian tube where fertilisation occurs. If fertilisation is successful the resulting embryo (a fertilised egg) begins developing as it moves down the fallopian tube and into the uterus. The embryo enters the uterus on the fifth day of development where it then implants in the endometrium and begins to establish a blood supply.

Luteal Phase

This is the second phase of the menstrual cycle, and occurs usually from ovulation on day 14 until the next period begins. After ovulation has occurred, the appearance and function of the ruptured follicle changes (it is now called a Corpus Luteum). The Corpus Luteum starts producing progesterone (P4). This hormone prepares the endometrium to receive an embryo.

If an embryo implants it will begin its own production of a hormone called Human Chorionic Gonadotrophin (hCG). If the level of this hormone does not continue to rise two events will happen: firstly the growth of the endometrial lining ceases and shrinks due to decreased blood flow; and secondly the Corpus Luteum begins to deteriorate around day 22, causing a fall in the progesterone level. Preparation to shed the endometrium begins, and a period occurs approximately five days later.

Overview of IVF / ICSI Treatment

IVF gives many infertile couples the best chance of achieving fertilisation and pregnancy. It involves stimulating the ovaries with a higher amount of FSH than your body naturally produces in order to stimulate more than one egg to develop to maturity. When the growing follicles reach the appropriate size the eggs are collected from the ovaries.

Once the eggs have been collected, sperm are then introduced in the laboratory. The following morning the eggs are assessed for fertilisation. Embryos are then cultured for up to six days. An embryo is transferred back into the uterus three to five days following the egg collection. Any remaining good quality embryos are then frozen for future use.

Fertility Plus uses the following protocols for IVF treatment:

Antagonist Cycle: this is the most commonly used protocol at Fertility Plus. An Antagonist Cycle is a short stimulation cycle and does not require down regulation.

Long course Agonist Cycle: this involves putting a woman's own hormonal cycle 'on hold', with a daily injection of a GnRH agonist (buserelin), so that we can then artificially stimulate the cycle. This first stage is called 'down regulation' and takes approximately two weeks.

Low Responder/ Microdose Flare: this protocol is used if the response of your ovaries to FSH is expected to be low. This may be due to a number of factors including: low AMH, high FSH, age, or you have had a previous low response to IVF. This cycle plan is specific to each individual and may include adjuvant therapies, such as testosterone, Menopur or other drugs. A detailed treatment diary will be provided to you if this is the most appropriate plan for you.

Commencing treatment

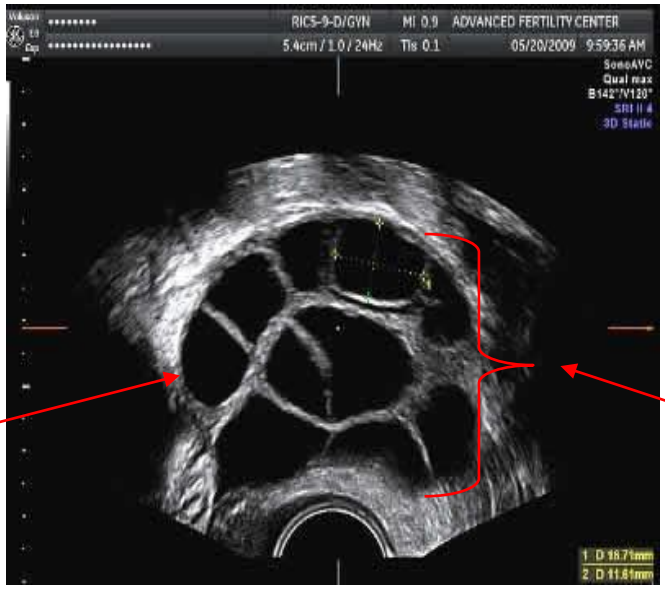
IVF treatment cycles commence on day one of your menstrual period; some women will take the oral contraceptive pill to set the timing of their cycle. On day one, please phone the nursing team at Fertility Plus to register the commencement of treatment. You will be advised of the next steps. Once your treatment dates have been set, you will need to visit Fertility Plus to collect a treatment pack. This pack will contain all the information you require, as well as your drugs for injection. All blood tests are done at Lab Tests and request forms are electronic.

Ultrasound Scans

The scans are performed at Fertility Plus. Ultrasounds scans are used to determine the response of the ovaries to the stimulation drugs that you will be taking. Ultrasound scans are also performed to measure the thickness of the endometrium and help to assess the location of the ovaries for the egg collection.

All scans are vaginal (internal) and require an empty bladder. The only time a full bladder will be required is for your embryo transfer.

Image of an ultrasound scan monitoring the developing follicles on a stimulated ovary



Follicle

Ovary showing multiple follicles

Drugs Used in Fertility Treatment

Most of the drugs that you will be required to administer are given by subcutaneous injection, others will in a tablet or patch format and you will be shown how and when to take these.

Subcutaneous injections are given via a small needle placed just under the surface of the skin and you will be shown how to do these injections yourself.

GnRH Agonist (buserelin)

Buserelin is a GnRH agonist which works by suppressing the release of FSH and LH from the pituitary gland, thus causing 'down regulation' of these hormones in preparation for treatment. However, in the first two days after buserelin administration, there is a temporary rise of the LH and FSH levels, before they then begin to decrease. You will continue to administer this injection each morning until the day of your trigger injection.

GnRH Antagonist (Cetrotide or Orgalutran)

The GnRH antagonist (Cetrotide or Orgalutran) works by directly blocking the effect of GnRH, which is the hormone that causes the release of LH and FSH. This prevents the premature LH surge in women undergoing controlled ovarian stimulation. This allows eggs to reach the level of development needed for the eggs to be collected.

The antagonist only needs to be administered once follicles are at risk of an LH surge and it is only needed for a short part of the cycle once stimulation has begun. Once you commence this injection you will continue to administer it each evening until, and including, the day of your trigger injection.

Follicle Stimulating Hormone

There are four preparations of FSH currently available, Elonva, Puregon, Gonal-F, and Menopur which are used to stimulate the ovaries.

The function of FSH is to stimulate the growth and maturation of multiple follicles. As follicles grow they produce increasing amounts of estradiol, which also stimulates the growth of the endometrium.

Elonva is one injection lasting seven days, given by your fertility nurse.

Puregon and Gonal-F are preloaded “dial up pens” that are taken daily each evening, and administered by the patient.

Menopur is an FSH/LH mix. It comes as a powder which needs to be reconstituted before use, is taken daily each evening, and administered by the patient.

Trigger injection

The trigger injection initiates a final maturation of the eggs in preparation for egg collection in the same manner that LH matures the egg for ovulation in a natural cycle.

There are two different trigger injections: Ovidrel and buserelin.

Ovidrel is the trigger injection used by most women. It is an hCG trigger that causes maturation of the eggs in preparation for egg collection.

Buserelin is used for antagonist cycles, when there are a large number of follicles. This is used to reduce the risk of hyper-stimulation. After using a buserelin trigger, it is usual to freeze all of the appropriate embryos. After administering this injection you will need to do a blood test the next morning to confirm it has caused an LH surge.

All trigger injections are timed to be completed in the evening, to coincide with the theatre booking for egg collection. The trigger injection will be your final injection.

Please do not have unprotected intercourse during your IVF cycle.

We are stimulating the ovaries to produce multiple eggs. In the eventuality that not all the eggs are retrieved during the egg collection, having unprotected intercourse could result in natural fertilisation and multiple pregnancy.

Progesterone

There are two types of medication available to support the endometrium following your embryo transfer. One of these will be given to you the day of your egg collection and should be commenced the following day.

1. **Utrogestan** pessaries are inserted vaginally or rectally three times a day up until your pregnancy test. If your pregnancy blood test is positive you will continue the pessaries until week nine of pregnancy. Utrogestan contains peanut oil so if you have an allergy to nuts you will be prescribed an alternative.

2. **Crinone** is a once a day gel applicator that is inserted vaginally each morning.

IVF Antagonist Protocol

The antagonist protocol of ovarian stimulation is the shortest method of stimulating egg development. The cycle may sometimes begin by using the oral contraceptive pill (OCP) to set dates, and when this occurs there is a five day break (washout) when the OCP is stopped. Stimulation with FSH injections then begins and once the follicles have reached a certain size, the antagonist drug (Orgalutran) is administered. This drug prevents a natural LH surge causing the follicles to ovulate. The two injections are taken in conjunction and continued until the day of trigger.
If using the OCP the nurses will advise you of the start and stop dates. You should expect a withdrawal bleed after you stop the OCP and before you start the FSH.

Ovarian stimulation – follicular phase

Day 1 of stimulation: The stimulation drug FSH (Puregon, Gonal F or Menopur) is taken at the prescribed dose in the evening. If Elonva is your prescribed FSH, this is given by your fertility nurse at the clinic.

Day 6 of stimulation: Blood test. Depending on the blood test result the antagonist drug is started and taken every evening thereafter.

Day 7-12 of stimulation: Repeat blood test and scan.

You will continue to administer daily FSH and antagonist injections in the evening as advised. A decision will be made as to when the eggs are ready to be collected and a time will be given for the trigger injection. Further blood tests and scans may be required before this decision is made.

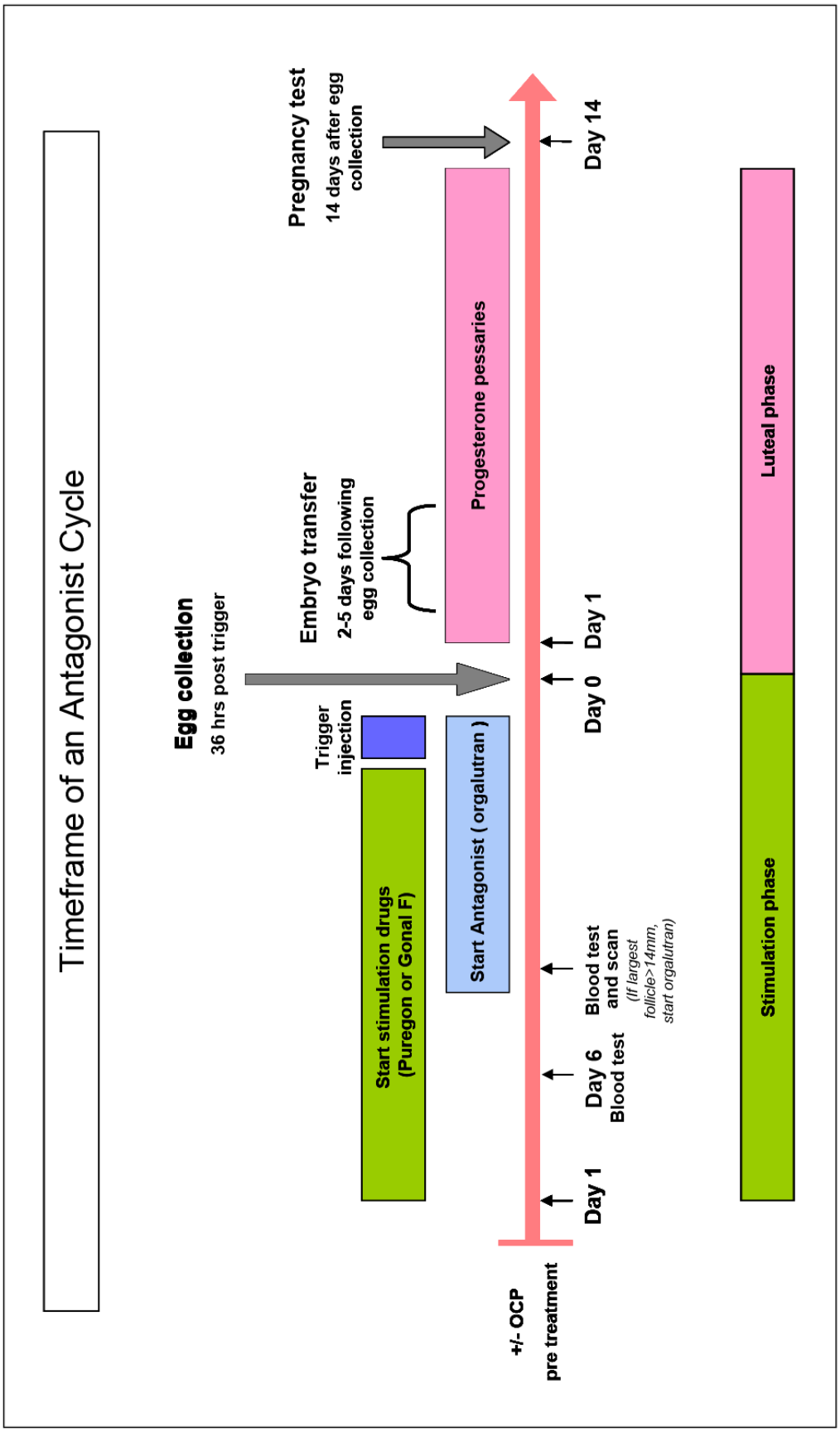
Please be aware people respond differently to treatment and it is possible that your cycle may take longer than expected.

Contact with Nurses

Please phone the nursing team with your period (day one) the month **before** your 'treatment' month.

For example, if your egg collection planned for June, call the nurses with your May day one. You will then be advised if any outstanding tests need to be completed or if you need to commence the OCP.

Timeframe of an antagonist cycle



Timeline not to scale

IVF Agonist Protocol – Long Course

Down regulation

The long course cycle involves taking daily morning injections (buserelin) to "take over" your cycle and switch off (down regulate) the ovaries so that we can then introduce stimulation injections to grow follicles. Down regulation occurs when the blood estradiol and progesterone hormones drop to a very low level known as their baseline level. The hormone levels return to normal once administration of buserelin is stopped. Buserelin is usually started on day 21 (mid-luteal) of your menstrual cycle, once a blood test confirms ovulation has occurred. Occasionally if your menstrual cycle is shorter or longer than 28 days, buserelin maybe started on a different day (other than day 21).

A blood test is carried out two weeks later to confirm your hormones have decreased/down regulated, before starting the stimulation injections. It is normal to have a menstrual bleed around this time.

If the hormone levels do not down regulate as expected, it may be necessary to have a scan and to continue administering buserelin for a longer length of time before stimulation injections can begin. This usually means your egg collection will be delayed.

When you are down regulated, daily buserelin injections continue in conjunction with the daily stimulation injections until 'trigger' when the eggs are ready to be collected.

Occasionally, if recommended by the doctor, a 'short course' buserelin cycle may be suggested. This is where buserelin is started on day one and stimulation with Puregon or Gonal F on day two.

Ovarian stimulation – follicular phase

Day 1 of stimulation: Addition of the second daily injection, Puregon, Gonal F or Menopur at night.

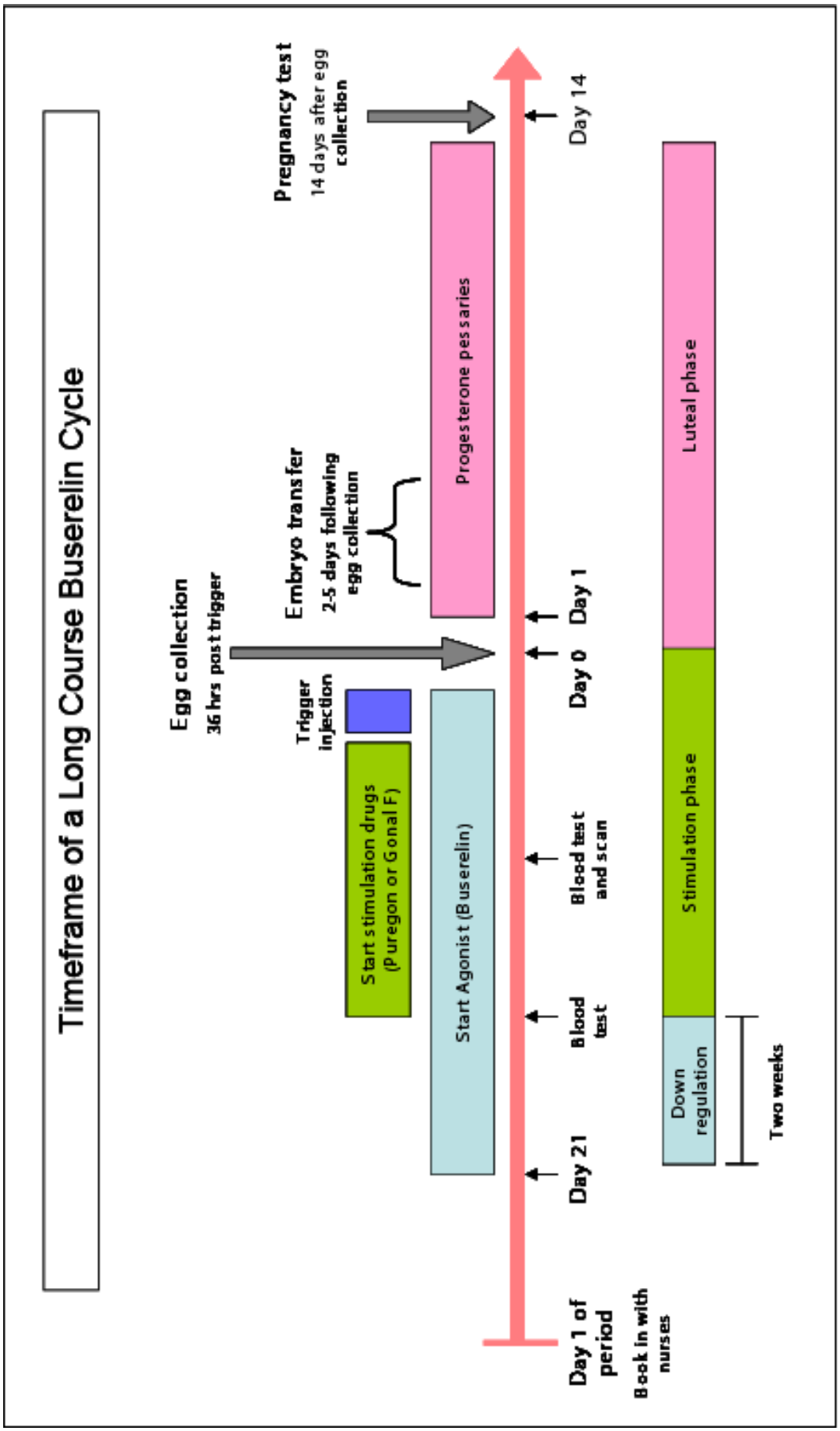
Day 7 or 8 of stimulation: Blood test and an ultrasound scan, to monitor ovarian stimulation.

Day 9-11 of stimulation: Repeat Blood test and scan.

You will continue to administer daily buserelin injections and Gonal F/ Puregon/Menopur injections as advised. A decision will be made as to when the eggs are ready to be collected and a time will be given for the trigger injection. Further blood tests and scans and/or blood test may be required before this decision is made.

Please be aware people respond differently to treatment and it is possible that your cycle may take longer than expected.

Timeframe of an agonist long course cycle



Egg Collection

Please do not eat and drink from six hours before your egg collection, other than sips of water up until two hours before. You will be asked to take paracetamol before coming in for the procedure, which can be taken with a small amount of water. A nurse will give you full instructions prior to your egg collection.

On the day of your egg collection do not wear any perfume or highly scented body lotion as these can be detrimental to the eggs, sperm and embryos in the laboratory.

You cannot drive, operate machinery or make important decisions for 24 hours following the sedation that you will be given for your egg collection. Please ensure someone is available to drive you home and stay with you following this procedure.

The male partner needs to provide a semen sample on the day (unless frozen sperm or donor sperm is being used). A period of two to three days abstinence is optimal. Samples are usually produced by masturbation in a private room at Fertility Plus but can also be produced at home and brought to the laboratory within one hour of ejaculation. The sample must be delivered by the male partner and photo identification is required. If you wish to bring the sample from home, please let the laboratory know on 09 630 9842.

What the procedure involves

A vaginal ultrasound probe, with a needle guide attachment is inserted into the vagina. Using the ultrasound scan for guidance, the follicles are visualised on the ultrasound screen and a needle is then inserted through the top wall of the vagina into the ovary. The fluid in each follicle is then drained and an embryologist will check the fluid for the presence of an egg. It is important to note that an egg is not always retrieved from every follicle.

The egg collection is done under deep intravenous sedation administered with an anaesthetist. The anaesthetist will insert a small needle into a vein where medications will be administered to ensure you are comfortable throughout the procedure. You may or may not have some awareness during the procedure. The medications are quite short acting and you will be awake and able to drink fluids shortly after the procedure, which takes around 30 minutes. Following the egg collection you will spend one to two hours in recovery for rest and monitoring. If you are required to have this procedure performed under general anaesthetic, you will be instructed accordingly.

After your egg collection you may feel bloated or have abdominal pain and/or spotting. This is completely normal. If you have any concerns about pain or discomfort, please do not hesitate to discuss it with us prior to your egg collection. Very occasionally, women may experience heavy bleeding following their egg collection.

Freeze All Cycles

Your doctor may recommend that you do not have a fresh embryo transfer, and instead your embryos are frozen. The most common reasons for this are:

- Risk of Ovarian Hyper-stimulation Syndrome (OHSS)
- Raised progesterone in your follicular phase.

This will be discussed with you at the time of trigger and/or egg collection. The embryologist will advise you of the number and stages of embryos that have been frozen.

A small number of women over stimulate in response to the FSH, producing more than fifteen eggs. If the doctor is concerned that you are at risk of OHSS, then a decision may be made not to carry out a fresh embryo transfer but to freeze any embryos that develop to the appropriate stage. This avoids the possibility of OHSS being exacerbated by the hCG hormone, should a pregnancy occur. A frozen embryo transfer can be performed in a later cycle once the ovaries have returned to normal.

Stopping an IVF Cycle

Occasionally an IVF cycle is stopped before egg collection. Reasons for this include:

- Risk of OHSS
- Development of fewer than three follicles after FSH
- Physical factors detected by consultant at scans
- Patient choice

Luteal Phase

Once you have had your egg collection you enter the second phase of your treatment cycle - this is known as the luteal phase. You will be given vaginal or rectal progesterone pessaries to begin using from the day after your egg collection (this is your luteal day one). The pessaries are very important for preparing and supporting the endometrium for embryo implantation.

Embryo transfer

An embryo will be replaced into your uterus three or five days following egg collection. The embryologists will discuss the timing of your transfer with you after the fertilisation check and will review this decision on day three.

It is a relatively painless procedure, and is similar to having a smear done. You will be asked to fill your bladder prior to the transfer, which helps ensure a clear view on the scan and helps to straighten out the uterus allowing for an easy transfer. You will need to drink three medium sized glasses of water within an hour of your scheduled transfer.

The embryologist will place the embryo into a fine plastic tube called a catheter in the laboratory. The doctor will pass the catheter from the vagina, through the cervix and the embryo is then released into the uterus. The catheter is checked by the embryologist to make sure that the embryo has been successfully transferred. After the embryo transfer procedure is complete you can get up straight away, the embryo will not 'fall out' as the internal walls of the uterus hold the embryo snugly.

You will not be able to enter the laboratory to view your embryo before. If you wish to have a photo of your embryo you may ask for this prior to your transfer.

Single Embryo Transfer Policy

Fertility Plus has a single embryo transfer policy. The principle of single embryo transfer is to give each single embryo that is transferred its maximum opportunity to implant and develop into a healthy pregnancy and to avoid multiple pregnancies. Multiple pregnancies carry a much greater risk for pregnant women and for the babies than singleton pregnancies. It is important to note that twins can still arise from a single embryo transfer; this can occur when the embryo divides, resulting in identical (monozygotic) twins.

Double embryo transfer is only considered for patients who have previously had four unsuccessful single embryo transfers. Patients wishing to discuss having a double embryo transfer on their fifth replacement are required to have a booked consultation with a fertility doctor to discuss the risks involved.

Following your embryo transfer

Following the embryo transfer you will continue to use progesterone pessaries until your pregnancy test, if you have a positive pregnancy blood test then you will continue the pessaries until week nine of pregnancy. These are vital in order to maintain the endometrium for implantation and also to support early implantation, so must not be stopped until a pregnancy test is taken. Some people may experience spotting or some bleeding while waiting for their pregnancy test. If this occurs, it is important to continue with the pessaries and contact the nurses. Do NOT stop taking your progesterone support.

After the embryo transfer you may resume your normal daily activities. It is a good idea to avoid strenuous exercise and heavy lifting. It is also advisable to refrain from spa pools or baths due to the small risk of infection, and to avoid saunas or hot yoga due to the increase in core body temperature. There is a lot of advice on the internet regarding what to do following your transfer however please be mindful that information from the internet may not always be from a reliable source.

Pregnancy test

The outcome of this IVF cycle is confirmed by a blood test approximately 14 days after your egg collection if you have a fresh embryo transfer. If you have a frozen embryo transfer, the pregnancy test will usually be 9 days after your embryo has been transferred. If your first pregnancy test is positive, you will be asked to repeat the test two or three times before having an ultrasound scan to confirm a uterine pregnancy. The pregnancy hormone (hCG) level needs to rise appropriately; the nurses will discuss this with you following each test.

If the pregnancy test is negative the nurses will discuss your next step with you. Your cycle will be reviewed by the medical and scientific director and you will receive a review letter following this. You may also request a face to face review appointment with one of our consultants if you wish. After a negative pregnancy test you may need a few days to reflect on your future options. Please call the nurses at any time to make a review appointment if you wish to have one.

What Happens in The Fertility Laboratory?

The embryologists at Fertility Plus perform all of the embryology (the care of eggs and embryos) and andrology (sperm) procedures. Please feel free to ask them any questions that you may have in regard to your eggs, sperm or embryos.

Egg Collection

During the egg collection, the embryologist is present in theatre. The doctor collects fluid from each follicle in the ovary, which drains into a test tube. The embryologist then checks this fluid under the microscope for an egg. If an egg is found, the embryologist will transfer it into a test tube containing special nutritional liquid called culture medium. After the egg collection, the embryologist will transfer the eggs into a fresh dish of culture medium and place it in the incubator.

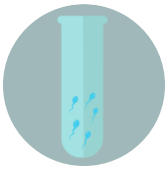
While there is usually an egg developing in every follicle, we may not retrieve an egg from every follicle. We usually retrieve eggs from approximately 80% of follicles. If an egg is not retrieved after the follicle has been drained, some culture media will be introduced into the follicle in an attempt to flush the egg out. Very rarely have there been situations where no eggs are retrieved. It is possible to retrieve immature eggs from the smaller follicles.

Semen Sample

On the day of egg collection, the laboratory will need a semen sample from the male partner. Samples are usually produced in a private room at Fertility Plus but can also be produced at home and brought to the laboratory within one hour of ejaculation. If you wish to bring the sample from home please let the laboratory know on 09 630 9842. The semen sample must be brought to the laboratory by the person who produced it, and they must bring photo identification which will be checked by the laboratory staff.

The male partner is recommended to abstain from masturbation or sexual intercourse for two to three days prior to treatment. The sample is produced by masturbation, with care being taken not to contaminate it with any toxic agent such as soap, lubricants or condoms.

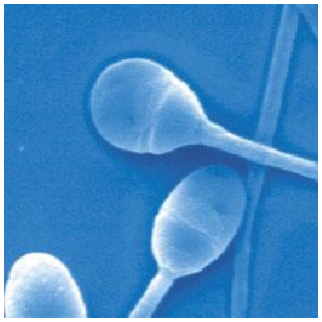
Please contact one of the embryologists if you have any concerns about producing a semen sample. We can freeze a sample as back-up if the male partner is concerned about not being able to produce a semen sample or is unable to be at the clinic on the day of egg collection. There is a charge for freezing and storage. Please note that this will not be covered by government funding unless this is requested with a medical referral.

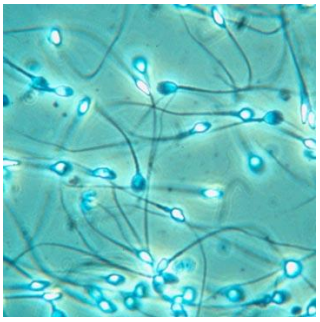


Semen Preparation

Once we have received the semen sample, it is spun through a gradient of 'wash' solutions. This is to harvest the good quality, fast moving sperm for treatment. The sperm is then added to the eggs four to six hours after egg collection.

Human Sperm





The sperm can be added to the eggs in two ways: **In Vitro Fertilisation (IVF)** or **Intra-cytoplasmic Sperm Injection (ICSI)**.

In Vitro Fertilisation (IVF)

In cases where there is no indication of any semen abnormality or male factor infertility, approximately 200,000 motile sperm are added to the medium containing the eggs. The dish is then returned to the incubator overnight and the sperm are left to make their way to the eggs and attempt to fertilise them. The day of egg collection and insemination is called day zero.

Intra-cytoplasmic Sperm Injection (ICSI)

ICSI revolutionised the treatment of male factor infertility. Men with low sperm numbers, reduced motility or high numbers of abnormal forms have the opportunity to become genetic parents. Even men who have sperm production but no sperm in their ejaculate can have sperm retrieved directly from the epididymis by:

- MESA (microepididymal sperm aspiration),
- PESA (percutaneous epididymal sperm aspiration) or by
- TESE (testicular sperm extraction from a piece of testis). TESE is used for non-obstructive azoospermia when there is impaired spermatogenesis.

If applicable, your doctor will discuss with you the best option for you considering your clinical diagnosis. For many people ICSI now offers an alternative to donor sperm.

What is involved?

In conventional IVF approximately 100,000 motile sperm are added to the eggs in a dish and overnight the sperm fertilise the mature eggs. In ICSI a single sperm is injected directly into the centre of each mature egg. The eggs are prepared by removing the surrounding mass of cells in a process called denuding. This enables the embryologist to grade the maturity of the egg. Only mature eggs can be injected. Approximately 80% of collected eggs will be mature, 20% will either be immature or abnormal and therefore not suitable for injection. From the carefully prepared sperm sample the embryologist will choose a motile sperm and inject it into the egg. The following day the eggs are checked for fertilisation. Usually approximately 70% of injected eggs will fertilise normally. However, this will vary depending on the quality of sperm and/or eggs.

Very occasionally, particularly following TESE, there may not be enough sperm found to inject all of the mature eggs retrieved.

Chance of success

The chance of a pregnancy is similar to that in IVF. Following your transfer, any extra **good quality blastocysts** will be frozen for your use in the future.

Risks associated with ICSI

Miscarriage rates for couples with male factor infertility tend to be slightly higher than for other causes of infertility, but this is also true after conventional IVF. The rate of major neonatal or foetal abnormalities in ICSI pregnancies is similar to that following IVF, and this has been shown to be similar to the rate in "normal" non-assisted pregnancies at about 25 per 1000 births.

Chromosomal Abnormalities

There has been some concern that ICSI may increase the risk of chromosomal abnormalities. However, to date, large-scale studies indicate that ICSI does not increase the chance of chromosomal abnormalities above that in the general population except for a slightly increased risk of abnormality in the sex chromosomes. This is almost certainly because of abnormalities in the sperm used, and not because of the technique itself. Unless the poor semen quality is due to a known obstruction, the man will be advised to have analysis of his chromosomes (karyotyping).

Y Chromosome Deletions

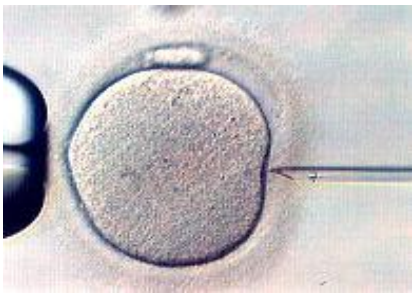
It is known that sperm production is largely controlled by genes located on the Y chromosome. Approximately 10-15% of sub-fertile men have parts of these genes missing and therefore have poor or absent sperm production. Without ICSI this poor sperm production prevents reproduction and therefore the inheritance of these gene deletions. It is clear that ICSI can perpetuate infertility by transmitting gene deletions to sons born from ICSI. That is, sons born from ICSI will inherit their father's gene deletion(s) and will therefore also be infertile and may themselves require fertility treatment in order to have a baby.

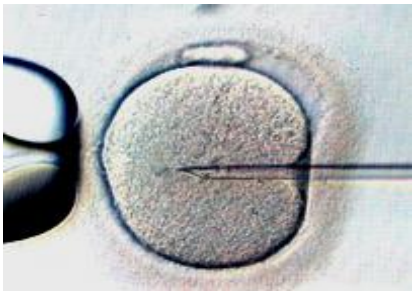
Increased incidence of Cystic Fibrosis Gene mutations in azoospermic men

It appears that 5-10% of azoospermic men have congenital bilateral absence of the vas deferens (CBAVD), a condition associated with certain cases of cystic fibrosis (CF). Two thirds of men with this condition appear to be carriers of CF mutations. CF testing and genetic counselling may therefore be indicated for azoospermic men with this condition.

A Mature Human Oocyte (Egg)

The egg is held steady by gentle suction and the sperm is positioned near the tip of the needle before being injected into the egg.





Fertilisation Check

On the morning of day one the embryologists will check to see if the egg has fertilised. A fertilised egg becomes known as an embryo.

For IVF cases, the cumulus cells surrounding the eggs are removed about 18 hours after insemination. This is achieved by gently sucking the egg up and down in a fine plastic pipette. For ICSI cases, the eggs are already free of cumulus cells on day one and the embryologist can check for fertilisation at 16- 18 hours post sperm injection.

The embryologist will then be able to check for two pronuclei (2PN), which appear as two circles at the centre of an embryo. One PN contains the genetic material (chromosomes) from the sperm and the other PN contains chromosomes from the egg. All eggs with 2PN are normally fertilised embryos.

A normally fertilised (2PN) Embryo

Approximately 7% of eggs are found to fertilise with more than two pronuclei present. This can be due to either the egg not being at the correct stage of maturity when it is exposed to sperm, or, where more than one sperm enters the egg. These eggs can result in an abnormal foetus and miscarriage, so they are discarded and not replaced or frozen.

Once embryos are assessed for fertilisation they are transferred into fresh culture medium and returned to the incubator.

The fertilisation rate varies from person to person. On rare occasions (1%) there may be no fertilisation and therefore no embryos to transfer. An embryologist will phone you the morning after egg collection to inform you how many eggs have fertilised.

The average fertilisation rate is 70%. Sometimes less than 70% of eggs may fertilise. This can occur particularly in cases of severe male factor infertility after ICSI.

Artificial Oocyte Activation

Artificial Oocyte Activation (AOA) is an adjunctive procedure that can be offered to patients who have had a total fertilisation failure or unusually low (below 30%) fertilization rate after ICSI (Intracytoplasmic Sperm Injection) in their previous cycle.

ICSI is typically used in cases when there is not enough sperm available to achieve fertilisation with standard IVF insemination. It might also be used when there was failed or low fertilisation (below 30%) with standard IVF in a previous treatment cycle.

The average fertilization rate after ICSI is around 70%. However, in a rare number of cases (1%) fertilization after ICSI does not occur. In addition, in a small number of cases, fertilisation rate is well below the expected average values. The underlying causes of no or very low fertilisation after ICSI are related to the processes that take place after sperm penetrates the egg (oocyte).

What is Artificial Oocyte Activation (AOA)?

When the sperm enters the egg, one of the first events that happen is egg activation. Egg activation triggers a release of calcium from the egg's internal storage, which in turn allows for fertilisation and subsequent embryo development. In some cases, activation of the egg does not occur.

AOA can help activate the egg by using a special reagent, called Calcium Ionophore, which causes an increase in calcium in the egg, thus enhancing the chance of fertilisation. AOA reagent is applied to the eggs immediately after ICSI is done and cannot be a used the following day for the eggs after they failed to fertilise.

Failure of fertilisation can still occur even though AOA was used. This can be due to some other reasons related to the sperm, egg or sperm-egg mutual interaction.

Are there any risks Involved?

Currently, no adverse effects associated with the use AOA on a health of the offspring have been reported. However, the number of published cases is still small.

When AOA can be used?

AOA is suitable for patients who have a history of a persistent lack of or unusually low fertilisation after ICSI. In some cases, failure of fertilisation or very low fertilisation rate can occur in one ICSI cycle due to an egg factor which may not be seen in another cycle. The doctor will advise you if AOA is an appropriate treatment option for you.

Other Laboratory 'Add-ons'

A number of additional laboratory processes have been used in various situations with the hope of improving ART success rates. These include, but are not limited to; physiological intra-cytoplasmic sperm injection (PICSI), intra-cytoplasmic morphologically sperm selected injection (IMSI), artificial embryo hatching, and the use of GM-CSF media for embryo culture. There is limited or no evidence of benefit, and possible evidence of harm with using these treatments. Therefore, we do not offer these treatments through Fertility Plus. You may discuss this further with your fertility doctor or embryologist.

Early Embryo Cleavage

Twenty four hours after insemination the embryos are assessed. This is to record if any of the embryos have already begun dividing (early cleavage). Very occasionally, some eggs which were previously thought to be unfertilised may now have 2PN present, this is known as delayed fertilisation.

Embryos are assessed once a day on days three, five and six. They are not assessed on day two or four. You will receive a phone call from your embryologist at fertilisation check (morning), on day three (morning), and again on day six (usually afternoon) to inform you about the outcome of any remaining embryos.

Not all eggs that fertilise will continue to grow and divide into a normal embryo. It is important that you are aware that it is normal to have a variation of embryo stages (cell number) and grades in your group of embryos at any point during culture. We do not expect every embryo to be capable of going on to form a blastocyst, which can potentially achieve a pregnancy. The embryologist will be able to give you some indication of how your embryos are developing and which one we are replacing and why. On average, approximately 35% of fertilised eggs go onto develop into blastocysts in culture.

Embryo Transfer

Embryo transfer can take place on either day three or five. The embryologists will grade your embryos based on morphological features such as cell number, size, shape, and degree of fragmentation. The best quality embryo is replaced and any remaining viable embryos are grown until day 6 or 7 and can be frozen on day five, six or seven if they are suitable.

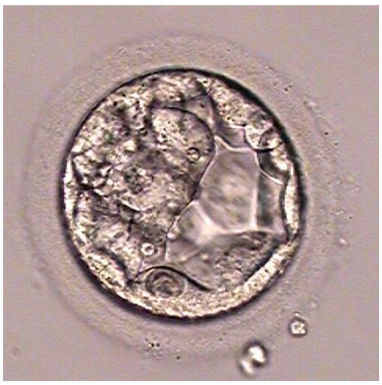
Following fertilisation check most patients will be given a potential embryo replacement time for day three (unless otherwise advised).

The embryologist will assess embryo quality early in the morning of day three and will phone you to either to confirm your appointment or recommend postponing the replacement until day five. If it is clear which embryo is the best quality embryo (based on our assessment criteria), then the embryo should be replaced on day three. However, if there are at least two embryos at the right stage and quality on day three and it is a difficult choice between them the embryologist will recommend continuing to culture the embryos in the laboratory until day five. This is called blastocyst culture.

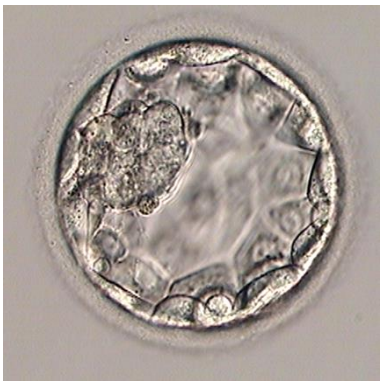
An embryo must develop into a blastocyst by day five to seven to be able to implant in the endometrium. The individually cleaving cells of the day three embryo must stick together (compact) and reorganise into two different cell types- the trophectoderm cells (which if the embryo implants give rise to the placenta), and the inner cell mass (which gives rise to the foetus).

Not all day three embryos will continue developing into a blastocyst. By culturing the embryos on, it enables us to see which ones continue developing, therefore we can select the best quality embryo for replacement.

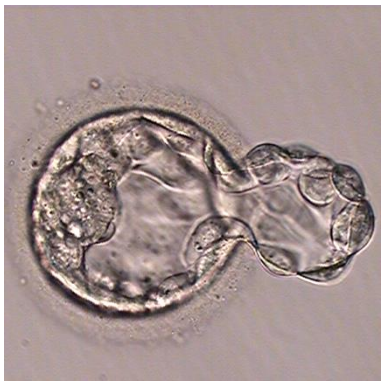
Although we would expect to get at least one blastocyst using our criteria, there is a small risk that there may not be any embryos that have developed into blastocyst by day five. It is important to realise that extended culture does not improve the quality of the individual embryos, therefore if we are able to select the embryo with the most potential on day three, we will recommend replacement on this day. This will be discussed with you following your fertilisation check.



Day five: Early Blastocyst



Day five: Expanded Blastocyst



Day six: Hatching Blastocyst

"Embryo Glue"

Embryo Glue is the trade name used by one media company for its transfer medium. Embryo Glue is not actually glue, but it acts like glue by increasing the chance of implantation of the embryo to the uterus. The key ingredients in this medium are called hyaluronan and recombinant human albumin, which both help to promote implantation. We use Embryo Glue for all embryo transfers at Fertility Plus.

Embryo Freezing

At Fertility Plus, approximately 50% of people having IVF will have embryos suitable for freezing following their IVF cycle. If there are any extra embryos remaining in culture after embryo transfer, they will be cultured until day six and sometimes day seven. If they develop into a blastocyst of suitable quality, they can be frozen. If patients have embryos which are not viable or do not wish to have embryos frozen, they can choose to have these embryos returned to them, or request that they are disposed of by the laboratory.

If you have embryos frozen following your publicly funded IVF cycle, public funding covers embryo storage for the first 18 months. If you have frozen embryos remaining after this time, you will be invoiced annually for storage. Embryos can be stored for ten years according to the Human Assisted Reproductive Technology (HART) Act 2004.

Embryo Thawing

Approximately 95% of embryos that are frozen survive the process of freezing and thawing.

Our SET policy applies to thawed embryos as well as fresh. Most patients will have a single blastocyst thawed and transferred. However, some patients have several embryos frozen at the early pronuclear stage. We advise thawing all of these embryos and culturing them until day three or five for embryo transfer. Any extra embryos which reach the blastocyst stage can be refrozen.

Patients must fill in a consent form consenting to thawing an embryo(s). This form must be signed by both people who created the embryos. These consent forms are to be completed and signed in the presence of one of the Fertility Plus clinical staff members or if you live out of town a Justice of Peace (JP) or your local Nurse practitioner at your GP surgery. Alternatively, you may request a Zoom meeting with our staff so a 'face to face' consent appointment can take place.

The embryologist will not be able to thaw the embryo(s) until the lab receives the consent form.

The laboratory must receive this consent form before the day the embryo is to be thawed. If we have not received your consent form, the embryologist will not be permitted to thaw your embryos.

It is often not necessary to take any fertility drugs in a frozen embryo replacement cycle. Your menstrual cycle is tracked with blood tests in order to detect when you are ovulating.

The date of ovulation will allow us to determine the appropriate day for your embryo to be thawed. Occasionally, an embryo may not survive the freezing and thawing process. In this case, if there is another embryo in storage this will be thawed. The lab staff will inform you before the time scheduled for transfer if the embryo does not survive.

Infection in culture dishes

The media we use to culture eggs, sperm and embryos contain antibiotics, but very occasionally the medium containing the embryos may become contaminated and cause the embryos to stop developing. At Fertility Plus we see this in approximately one in a thousand cases. Most semen samples do contain some bacteria, often from the skin. Very rarely the bacteria can be resistant to the antibiotics and therefore may continue to grow in the media. Yeast and bacterial infections could also be picked up at egg collection and be transferred to the culture dishes. To minimise the risk of contamination we advise men thoroughly wash their hands and penis with mild soap and water before producing a semen sample.

Quality Assurance

To eliminate the risk of misidentification of eggs, sperm and embryos, the laboratory has a cross-checking/double signing policy and system in place. All eggs/sperm and embryos are placed in dishes which are clearly labelled with the patient's name, NHI, date of birth and an electronic tracking tag. Fertility Plus uses an electronic tracking system for every movement of sperm, eggs, and embryos between vessels. Electronic witnessing has now become the global standard for avoiding identification errors in the laboratory. Patient and sample identification is subject to mandatory internal audit annually. The Reproductive Technology Accreditation Committee (RTAC) of Fertility Society of Australia and New Zealand has detailed guidelines for best practice on patient and sample identification, and this is what we follow at Fertility Plus. Every year, our process of sample identification is checked by external auditors as part of our certification to the NZ Fertility Standards and the RTAC Code of Practice.

Pre-implantation Genetic Testing for a Monogenic Disorder (PGT-M)

This is a technique which is available at Fertility Plus for patients who have a known genetic disorder and are at risk of passing on this disease to their children. It cannot be used for gender/sex selection.

Prior to PGT, the only prenatal methods available for testing genetic conditions were amniocentesis or chorionic villus sampling. However, with these techniques parents faced the dilemma of whether or not to terminate the pregnancy if a genetic abnormality was present. With PGT, we can screen genetic conditions in embryos and only transfer the unaffected embryo(s) before pregnancy is established.

PGT is a screening test carried out on a few cells from the embryo before transfer. PGT allows couples at risk of passing on a genetic disease to have a child that does not carry the genes for the disease and that is fully genetically related to them. The test involves a biopsy performed on an embryo between day 5 and day 7 (blastocyst) to screen for known genetic diseases or inherited chromosomal abnormalities.

PGT is most useful for patients who are at risk of passing on single gene defects like Cystic Fibrosis, Muscular Dystrophy or Huntington's disease.

Pre-implantation Genetic Testing for Aneuploidy Screening (PGT-A)

Errors in the early development of the sperm, egg or embryo can lead to an abnormal number of chromosomes in the developing embryos (i.e., missing or extra chromosomes). An abnormal chromosome number can cause implantation failure, miscarriage, or the birth of the child with a chromosome abnormality (e.g., Down syndrome). PGT-A can be used to screen embryos for abnormalities in chromosome number. Only embryos which are found to be 'normal' for the tested chromosomes are considered suitable for transfer to the uterus. This may be appropriate for couples who have experienced repeated IVF failure or repeated miscarriage who produce a large number of blastocysts. There is no public funding for PGT-A but is available through Fertility Plus privately. If you would like further information, please discuss with your fertility doctor.

Fertility Preservation

Fertility preservation options for women

Women may wish to choose to do fertility preservation either for medical reasons or electively for future fertility planning.

Cancer treatment may involve chemotherapy that damages eggs and depletes ovarian reserve, or radiotherapy in the region of the ovaries that can damage eggs or surgery to remove the ovaries or uterus. As the woman's oncology therapy is always first priority, these fertility preserving options are not always appropriate or relevant.

Options for fertility preservation include the following:

IVF with embryo freezing: If a woman is in a stable relationship with a person whom she would wish to have children with, IVF with a view to create embryos to freeze might be appropriate.

Egg freezing: While we have been vitrifying eggs for many years in New Zealand, the number of women returning to use their frozen eggs in an attempt to get pregnant is not yet at a level where we can provide reliable and meaningful data on the local experience.

The chance of success is largely determined by the woman's age at the time of freezing and the number of eggs frozen. Our data to date suggests that vitrified eggs have similar outcomes as fresh eggs.

This procedure requires the woman to undergo ovarian stimulation and an egg collection. The eggs are frozen immediately following egg collection.

Gonadotrophin Releasing Hormone (GnRH) analogue: Clinical trials in women with breast cancer showed that suppressing the ovaries with GnRH analogue during chemotherapy may protect against ovarian failure and reduce risk of early menopause, but there is no good data yet on fertility or pregnancy. This option is discussed at your consultation.

Fertility preservation options for men

Some medical interventions such as chemotherapy, radiotherapy or surgery, may temporarily or permanently affect sperm quality or result in sterility. Because of this, it's important for men who have not had children or whose family is not yet complete to consider **semen cryopreservation** before starting treatments.

Sperm freezing: A sample can be produced by masturbation and subsequently frozen and stored at a very low temperature in liquid nitrogen. If time allows, the patient may wish to freeze multiple samples prior to starting cancer treatment.

Testicular biopsy: If a patient is undergoing urgent surgery or it has not been possible for him to produce a sample by masturbation for sperm freezing, it may be possible for the surgeon to remove a small piece of testicular tissue during surgery. This tissue can be processed by Fertility Plus and can be frozen if sperm are found.

Fertility Plus Outcomes

The team at Fertility Plus is proud to share their recent statistics to illustrate the chances of pregnancy during fertility treatment. The statistics presented below represent clinical pregnancy rates for women of all ages having fertility treatment in 2022. A clinical pregnancy is defined as being a pregnancy that is confirmed by both appropriately rising levels of hCG and diagnostic ultrasound.

It is important to be aware that pregnancy rates differ according to age of the woman/couple and the underlying cause/s of infertility. Please speak to the staff at Fertility Plus if you like to learn more about our statistics that relate to your age and circumstances. The 'Your IVF success' calculator on https://yourivfsuccess.com.au/ website is also a useful tool.

IVF Cycles

In 2022 we started 480 stimulation cycles, which led to 442 egg collections, followed by 193 fresh embryo replacements. This resulted in 54 pregnancies, with a pregnancy rate per fresh embryo replacement of 28%. This pregnancy rate includes women of all ages having their own eggs collected (excludes donor and surrogate cycles) and includes all causes of infertility and women over 40. For women under the age of 40, having a single blastocyst transferred, the clinical pregnancy rate was 39%.

'Freeze All' cycles (where embryos are frozen and no fresh embryo transfer takes place) are generally undertaken for women with a high risk of OHSS, an elevated progesterone prior to egg pick up, or who has undergone an agonist trigger on an antagonist cycle. In the last few years there has been an increase in the percentage of 'Freeze All' cycles. In 2022 we completed 206 'Freeze All' cycles.

Thawed Embryo Cycles

There were 538 thaw cycles completed in 2022, resulting in 232 pregnancies with a pregnancy rate of 43%.

Donor Insemination Cycles

The pregnancy rate for donor insemination for 2019-2022 was 23%; Fertility Plus completed 120 donor insemination cycles, leading to 28 pregnancies.

Intrauterine Insemination Cycles

The pregnancy rate for intrauterine insemination cycles for 2019-2022 was 15%. This included 166 pregnancies resulting from 1090 intrauterine insemination cycles.

Risks Associated with IVF Treatment

It is important to remember that any medical or surgical treatment has risks, adverse effects and side effects. Anyone taking medication for any reason should be aware of the possible side effects and should report adverse effects to those managing their treatment. The drugs used for IVF are known to create some minor side effects, but there is no evidence of increased risk to newborns from these medications.

The aim of this section is to briefly review some of these risks. The Fertility Plus staff will be happy to discuss any of these issues with you at any time.

Drug Administration

GnRH agonist (Buserelin): the action is to cause an initial surge and eventual suppression of FSH and LH from the pituitary gland in the brain. When the ovary does not receive messages from the pituitary hormones it enters the same state as the ovary of a menopausal woman. Like menopausal women, you may experience hot flushes, headaches and skin dryness. This is temporary and these side effects will stop once the normal hormone balance is restored at the completion of treatment.

FSH (Elonva, Puregon, Gonal F or Menopur): These drugs are used to encourage development of multiple follicles in the ovaries. As the ovaries are swollen with follicles, some tenderness and swelling of the abdomen may be experienced. The increase in estradiol as a result of multiple follicle growth can cause breast tenderness. Some women also experience slight nausea and dizziness.

Some women report a localised reaction at the site of the injection. Any localised redness or swelling can be treated effectively with a cold compress or calamine lotion. If this reaction persists, or the redness and swelling do not subside, please contact Fertility Plus and speak to a nurse.

Occasionally, too many follicles develop, and a condition called **Ovarian Hyper Stimulation Syndrome** may occur.

Egg collection

The egg collection is carried out by removing the fluid from the follicles in the ovaries and searching for the eggs in the follicular fluid. This is usually performed under a deep intravenous sedation administered by an anaesthetist. A vaginal ultrasound probe is used with a needle which runs up through the top of the vagina and into the ovary. It is common to have mild abdominal pain and some spotting after your egg collection. Very rarely more serious complications can occur such as damage to structures surrounding the ovaries such as blood vessels and the bowels. Very rarely significant bleeding can occur which may require hospitalisation. Very rarely cases of pelvic infection following an egg collection have been reported. Your doctor may request antibiotics to be given via intravenous drip at the time of the egg collection if required.

If acute abdominal pain or a high temperature occurs following your egg collection please call the Fertility Plus Unit

or, outside clinic hours, the Women's Assessment Unit (WAU) at Auckland City Hospital on 09 631 0784.

Ovarian Hyperstimulation Syndrome (OHSS)

OHSS can be a complication of ovarian stimulation after fertility treatment with either Clomiphene tablets or FSH injections e.g., Puregon or Gonal-F. It is called a syndrome because there are many different signs and symptoms, but not all of them are necessarily present.

Many women who undergo an IVF cycle may develop some mild signs. Severe OHSS is much less common, but in some cases may be life threatening. In the case of severe OHSS hospitalisation and careful monitoring will be necessary. Fluid shifts from the blood circulation to other areas such as the abdomen and lungs. The cause is unknown, but it occurs when ovaries are stimulated and then exposed to the hormones LH or hCG (human chorionic gonadotrophin). OHSS typically does not occur if there is exposure to LH alone. Exposure to the hCG hormone is through the use of an hCG trigger injection, or pregnancy.

Risk factors for OHSS

- Polycystic ovarian syndrome
- Previous OHSS
- Estradiol (E_2) level greater than 15 000 pmol/litre on day of trigger
- Greater than 15 follicles on scan before egg collection
- Large number of small follicles at the time of egg collection
- Under 30 years of age
- Low BMI

What can be done if the doctor suspects OHSS during my cycle?

If the risk is detected early in the cycle, the doctor may suggest stopping the cycle and starting the next cycle with lower doses of ovarian stimulating drugs or a different stimulation protocol. For patients who are on an antagonist cycle, an agonist trigger (Buserelin) can be administered instead of hCG.

If the doctor is concerned at the time of the egg collection, it may be recommended that all viable embryos are frozen, and no fresh embryo transfer occurs in that cycle. This avoids the possibility of OHSS being exacerbated by the hCG hormone, should a pregnancy occur.

What should I look for?

Your doctor may be able to predict at egg collection if you are at risk from OHSS and will advise you at that point. The risk is based on how many follicles have developed and your estrogen hormone level. The most common time to develop OHSS is in the week after the egg collection. Should you become pregnant, the syndrome could be temporarily worsened due to the hormone (hCG) produced naturally in pregnancy.

Please discuss with the nurse/doctor if you experience:

Mild Symptoms

- **An uncomfortable or bloated abdomen**
- **Nausea and or vomiting**
- **Diarrhoea**

Moderate Symptoms

- **Flu-like symptoms - shortness of breath**
- **Reduced urine output**
- **Weight increase of 1 kg per day**
- **Tissue swelling in the upper thighs, pubic region and lower abdomen**

Severe Symptoms

- **Difficulty breathing**
- **Dehydration**
- **Pain around the ribs**

If you develop any of these problems, it is important to call the clinic as soon as possible.

Outside the clinic hours, contact the Women's Assessment Unit at Auckland City Hospital on (09) 09 631 0784.

Blood tests and an abdominal scan may be carried out to check for excess fluid and the size of the ovaries.

Mild OHSS usually disappears quickly; it rarely takes more than a week or two to resolve, particularly if you are not pregnant. Should you develop moderate or severe OHSS then you may need a hospital stay and medical treatment.

Multiple pregnancy

One of the concerns with IVF or ICSI treatment is multiple pregnancies, and there is a move worldwide to limit the number of embryos replaced to one. Multiple pregnancies are associated with significantly increased risks to mothers and babies, such as pre-term birth, admission to neonatal intensive care, stillbirth and complications of pregnancy and birth. Because of the risk factors associated with multiple pregnancies, Fertility Plus has a single embryo transfer policy. This means that we will replace one embryo per transfer in women. Our single embryo transfer policy has decreased our incidence of multiple pregnancies. 99% of all our transfers are performed with a single embryo. It is important to note that identical twins can still arise from single embryo transfer (monozygotic twins).

Ectopic pregnancy

The incidence of an ectopic pregnancy does appear to be higher following IVF than one would expect following natural conception (0.5 – 1% births)

Current research suggests the risk of ectopic pregnancy following IVF and embryo transfer is around 2.2%. The risk of ectopic pregnancy is also affected by reproductive health of the women carrying the pregnancy and factors like tubal infertility and endometriosis can slightly increase this risk.

Miscarriage

The chance of miscarriage in the first eight weeks of in an IVF pregnancy is about 15-20% but after the first three months, the risk of miscarriage is very low.

Cancer and Infertility

Evidence suggests that there is no increased long-term risk of cancer for women undergoing IVF treatment, even for women undergoing multiple IVF treatment cycles. This appears to be true for breast cancer and ovarian cancer, over which there were concerns as it was felt that they may occur more readily following the hormonal stimulation from IVF. This evidence is thus reassuring.

There have been two studies suggesting an increased risk of ovarian cancer long term for women treated with lengthy courses of clomiphene. We usually advise that, for women who require clomiphene treatment, no more than 12 ovulatory cycles of clomiphene overall should be used.

However, for women with a history of breast cancer, caution is advised when considering IVF treatment, especially if the cancer has been shown to be estrogen-receptor positive. Advice from breast specialists, as well as fertility specialists, is often sought in this circumstance.

Fetal abnormality following IVF/ICSI

The incidence of birth defects in naturally conceived children in New Zealand is approximately 6%. The recorded birth defects in children born after IVF at Fertility Plus since 2007 are 5.8% and for ICSI is 5.6%. There does not therefore appear to be any increase in abnormalities following these treatments at Fertility Plus, but we continue to monitor all birth outcomes.

Y-chromosome deletion

A small percentage of men with oligospermia or azoospermia (low sperm concentration or no sperm) will have parts of their male (Y) chromosome missing. The Y chromosome is a sex determining chromosome only present in the male karyotype and is passed from father to son. When ICSI is used to achieve fertilisation in someone with a Y-chromosome deletion this will be passed on to any son born as a result of treatment. Therefore, a boy born after fertilisation in this case will inherit oligospermia from his father and might need to undergo fertility treatment to conceive.

Cystic fibrosis

It appears that 5-10% of azoospermic men have congenital absence of the vas deferens (CBAVD), a condition associated with certain cases of cystic fibrosis (CF). Two thirds of men with this condition appear to be carriers of the CF mutation. CF testing and genetic counselling may therefore be indicated for azoospermic men with CBAVD.

Imprinting disorders

In the general population there is a small group of disorders known as 'imprinting disorders', examples of the more well-known imprinting disorders are Beckwith-Wiedemann syndrome, Transient Neonatal Diabetes, Angelman syndrome and Prader-Willi syndrome. There are some genes whose expression depends upon parental origin, for example despite two different copies of a gene being inherited, one from the mother and one from the father, only the paternal copy of the gene will be expressed, and vice versa, this is called 'imprinting'. In a very small number of people the normal imprinting process can be affected, thus causing an imprinting disorder. The incidence of these disorders is very rare in the natural population and is still very rare in IVF/ICSI babies. However, Beckwith-Wiedemann Syndrome has been shown to be slightly more common in babies born from IVF/ICSI (occurring in 1 in 3,000-5,000 births) than in babies conceived naturally (around 1 in 20,000). For further information on these disorders, please contact the staff at Fertility Plus. Based on current evidence, the risk of imprinting disorders following IVF is extremely small and does not warrant routine screening.

Glossary of terms

Adhesion: As related to infertility, the adhering of ovaries, tubes, uterus, bowel or abdominal lining to each other. May follow pelvic surgery, tubal infections or endometriosis.

Androgens: Male sex hormones.

Anovulation: The absence of ovulation. A period may still occur.

Antisperm antibody: Protein complexes found in blood, mucous and semen, which bind to specific sites (called antigens) on the surface of the sperm. They are found in both men and women and are produced by an immune response to semen.

Azoospermia: The absence of sperm in seminal fluid either due to blockage of sperm ducts or an impairment of sperm production.

Biochemical pregnancy: Where a positive hCG blood test results, however the level does not rise appropriately and eventually will decrease. Embryo implantation has occurred but is not sustained.

Blastocyst: A stage of embryo development. An embryo must reach blastocyst stage on day five to six of development to gain the ability to implant in the womb.

Catheter: A fine tube with a syringe attached, especially developed for transferring sperm or embryos into the uterus.

Cervical Mucus: Secretions produced by the cervix. At the time of ovulation, the consistency of mucous changes to assist the passage of sperm through the cervix. Just prior to ovulation this mucus plug becomes clear and sticky; the consistency is likened to raw egg white.

Cervix: A tubular muscle approximately 2cm long at the neck of the uterus connecting the uterus to the vagina.

Cleavage stage embryo: Embryos from the two-cell stage until compaction (from day one to four of development).

Clinical Pregnancy: A positive hCG test and ultrasound evidence of a foetal sac and heartbeat.

Donor Egg: Eggs taken from one woman and donated to another.

Donor Sperm: Sperm donated by a man who is not the woman's partner to be used for artificial insemination, IVF or ICSI.

Down Regulation: This refers to the 'shutting off' of the messages from the pituitary gland to the ovary, enabling control over the events in a cycle.

Estradiol: The female sex hormone which is produced by the follicle where the egg is developing. It is also produced by the placenta in pregnancy.

Ectopic Pregnancy: A pregnancy in which the fertilised egg implants outside of the uterine cavity, usually in the fallopian tubes, or very rarely on the ovary or the abdominal cavity.

Ejaculation: Semen released from the penis during orgasm.

Embryo: The fertilised egg in its earliest stages of development.

Embryo Transfer: The placement of embryos into the uterus using a fine catheter.

Endometriosis: The presence of endometrial tissue (the normal uterine lining) outside the uterus, such as in the fallopian tubes, ovaries and abdominal cavity.

Endometrium: The lining of the uterus which grows and sheds each cycle.

Fallopian Tubes: Two tubes approximately 10-14 cms long, connecting the uterus and ovaries. Their function is to carry the egg from the ovaries to the interior of the uterus and the sperm from

the uterus to the egg. They contain minute hairs to guide the passage of the ova. Fertilisation occurs in the fallopian tube.

Fertilisation: The penetration of the egg by the sperm to create an embryo.

Follicle: A structure within the ovary in which an egg develops. It is from the follicle's lining that estradiol is produced in the follicular phase, then progesterone in the luteal phase.

FSH: Follicle Stimulating Hormone. It is a gonadotrophin hormone secreted by the pituitary gland, which lies beneath the brain. This hormone stimulates the ovary to promote the development of an egg inside a follicle.

Gonadotrophin: A group of hormones which are capable of stimulating the testicles or ovaries to produce sperm or eggs respectively. The most common types are FSH and LH.

hCG: Human Chorionic Gonadotrophin. The presence of hCG hormone in blood or urine confirms a pregnancy. A blood test for hCG is taken 14 days after an IVF egg collection. The hormone is produced an implanted embryo. Once implantation has occurred and is established, this hormone level rises very fast to ensure the endometrium lining remains intact.

Hormone: A substance which is released from special glands into the blood stream and stimulates other glands or the tissues into activity.

Hormone Assay: The measurement of hormones present in the blood.

ICSI: Intracytoplasmic sperm injection. The injection of a single sperm into the centre of an egg to encourage fertilisation. This technique is used when male infertility is identified.

Implantation: The embedding of an embryo in the endometrium of the uterus.

Infertility: The inability to conceive or carry a baby to term after one year of unprotected sexual intercourse.

Intrauterine insemination: The placement of prepared sperm into the uterus using a fine insemination catheter.

Laparoscopy: A surgical operation using a telescope-like instrument to have a look at the pelvic organs.

LH: Luteinising Hormone. It is an ovary-stimulating hormone whose function is to promote the release the egg from the ovary into the fallopian tube. It also plays a role in changing the function of the ovulated follicle to start producing progesterone. Progesterone helps to maintain the lining of the uterus and prepare for implantation.

Male Factor Infertility: Where the male partner's sperm is below normal limits as defined by the World Health Organisation.

Male Masturbation: Manual stimulation of the penis to achieve ejaculation.

Oligospermia: An abnormally low number of sperm in the seminal fluid.

Oocyte: The egg cell produced in the ovary, also called ovum, egg or gamete.

Ovulation: The release of a mature egg from the ovary.

Ovulation Induction: The use of medication to promote ovulation in women who normally do not ovulate.

Progesterone: Female sex hormone produced by the corpus luteum on the ovary (ovulated follicle). Progesterone helps to maintain the lining of the uterus and prepare for implantation.

Pituitary: A gland located at the base of the brain that produces a number of important hormones

that play a role in growth, development and reproduction.

Semen: The fluid that is released during ejaculation. This fluid contains sperm cells and other secretions which assist the sperm to swim through the female reproductive tract.

Sperm: The reproductive cell of the male.

Testicle: The male sex organ where sperm production occurs.

Uterus: The womb. A pear-shaped muscular organ situated in the pelvic cavity between the bladder and the rectum. Its function is the nourishment and protection of the foetus during pregnancy.

Ultrasound: Ultrasound machines use sound pressure waves to generate images of internal organs. Ultrasound can detect the presence of cysts and other problems, follicle development, pregnancy and other masses.