

A vibrant peacock with its tail feathers fanned out, holding a blue egg in its beak. The background is a dense pattern of green and blue feathers with prominent 'eyes' (ocelli).

OVERCOMING MALE INFERTILITY

INSIDE:

- Causes of male infertility
- Testing and diagnosis
- Your treatment options explained
- Coping emotionally

ABOUT THIS BOOKLET

This series of booklets has been developed and written with the support of leading fertility clinics across Australia, and AccessAustralia – a national organisation that provides numerous services for people having difficulty conceiving. We also acknowledge the many people who spoke openly about their own experiences with assisted conception in order to help others experiencing a similar journey. Merck Serono thanks the many individuals, couples and Australian healthcare professionals, including fertility specialists, specialist nurses and psychologists who shared their knowledge and expertise during the production of these booklets.

Important notice: The information provided in this booklet does not replace any of the information or advice provided by a medical practitioner and other members of your healthcare team. Your doctor will determine the best medications and course of action for you based on your requirements and conditions.

Prescription medicines have benefits and risks. Use all medications strictly as directed by your doctor and raise any questions or concerns with them before, during or after using prescribed medicines. If you experience side effects consult your doctor.

Full information regarding the medicines listed in this booklet, including how they are taken and side effects, is available from the Consumer Medicine Information (CMI) sheets. These can be found at the TGA website (www.tga.gov.au) for Australian residents and the Medsafe website (www.medsafe.govt.nz) for NZ residents.

Medication availability and funding criteria may differ between Australia and NZ.

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INTRODUCTION

If you are reading this booklet, your doctor has diagnosed, or suspects that there is a functional, hormonal or sperm production problem that needs to be addressed before your partner becomes pregnant. It is important to understand that these kinds of



problems are more common than you might realise and that there are many simple and effective treatments available to help you, as a couple, conceive.

Traditionally, infertility has been thought of as a female problem, however, this is far from the truth. A male problem can be identified in approximately 40% of couples who have difficulty achieving conception.

Even with knowing the facts that you are not alone in experiencing male fertility problems, it is normal to feel shocked and stressed at this stage of your treatment journey. Unfortunately, male infertility is not a highly publicised or discussed medical condition and this can commonly lead to many different emotions including inadequacy, anger, guilt or sadness. Many men feel that they have been robbed of both their virility and masculinity and that they have 'let their partner down'. In dealing with these emotions, it is important that you regularly discuss how you feel with your partner and accept their understanding and support. While men and women process and approach problems in different ways, a 'she'll be right mate' attitude or bottling up your feelings will not help address the issue. Whether the cause lies with you or your partner, infertility is the problem of a couple, and finding a solution is a couple's shared challenge. Now is the time to 'attack the problem' not each other and seek the support of your healthcare team, family members, friends and the specific consumer organisations (listed in the back of this booklet) set up to provide you with information and advice.

WHAT IS INFERTILITY?

The term 'infertility' is used when the ability to become pregnant is diminished or absent. It does not mean that you are unable to have children but that you may require treatment or assistance to achieve a pregnancy. The term is generally used if a couple has not conceived after 12 months of regular unprotected intercourse or after six months for women aged over 35.¹ For men, infertility may involve the sperm, the testes themselves, the ducts that lead out from the testes or be a functional problem in relation to sexual activity.

While the rate of infertility has not increased in recent years, we are now more aware of the issue as more and more women and men seek treatment. In reality, about one in six couples have trouble conceiving and about one half of these couples will require medical assistance to overcome this problem.²

Many couples who have difficulty conceiving may have a specific medical condition hindering the woman's ability to become pregnant. In 40% of cases the issue is attributable to the female, while in 40% of cases the issue is traced back to the male.³ In the rest of the cases, fertility problems remain unexplained or are linked to both partners, resulting in both requiring some form of treatment.^{3,4}

One cause of infertility is the impact of a woman's age. Many couples do not realise that fertility will be lost at a relatively early age. Women will begin to lose their fertility (the quality and quantity of viable eggs) from age 35 years onwards, with it becoming very obvious at age 40. In contrast, male fertility can persist into old age even though sperm counts and semen quality start to deteriorate in men over the age of 45.

ONE IN SIX AUSTRALIAN COUPLES SUFFER INFERTILITY^{2,3,4}

- 40% female factors
- 40% male factors
- 20% mixed factors or unexplained

ARE THERE ANY SYMPTOMS?

Usually there are no obvious signs or symptoms of an infertility problem. Erections, intercourse and ejaculation will usually happen normally and the quantity and appearance of the ejaculated semen generally appear normal.



GETTING THE TIMING RIGHT

To give yourselves the best chance of falling pregnant, it is recommended you have unprotected intercourse every two to three days.¹ Another way to maximise the possibility of conceiving is to time intercourse for when your partner is at her most fertile – known as ovulation (when the egg is released during the monthly cycle). There are several methods that can be used to determine ovulation. You can access other *Pathways to Parenthood* booklets through the website merckserono.fertilityportal.com.au

THE MALE REPRODUCTIVE SYSTEM

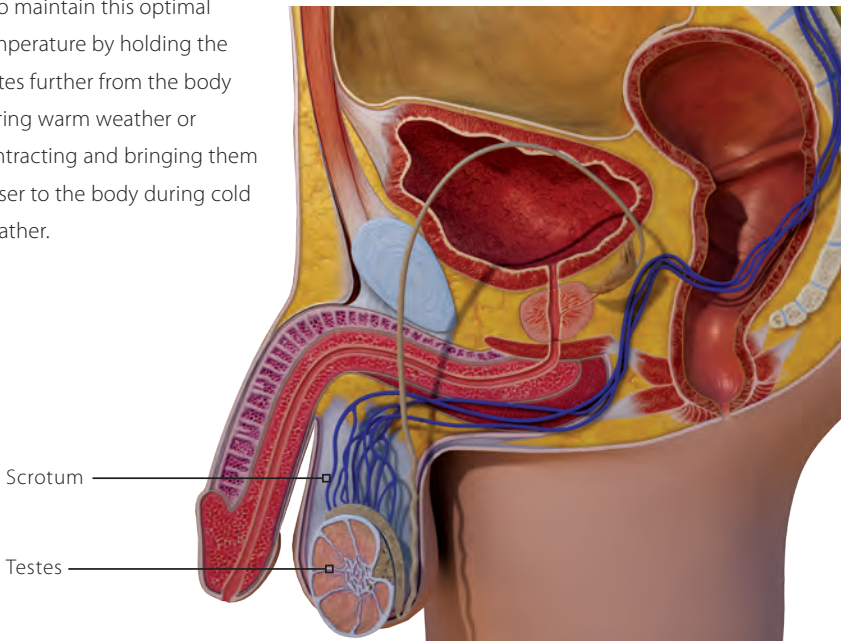
Before we discuss how infertility is diagnosed, the causes and treatment, it may be helpful to understand how the male reproductive system works and how sperm are produced.

Sperm production

Testes

The **testes** are the most important organs in male reproduction as they make both the sperm and the male hormone testosterone (which also helps sperm development). The testes are made up of very small tubes where the sperm mature. They lie outside of the abdomen, suspended in a fleshy sac called the **scrotum**.

In order to produce and nurture sperm, the temperature within the testes must remain approximately 1°C cooler than normal body temperature. Part of the function of the scrotum is to maintain this optimal temperature by holding the testes further from the body during warm weather or contracting and bringing them closer to the body during cold weather.

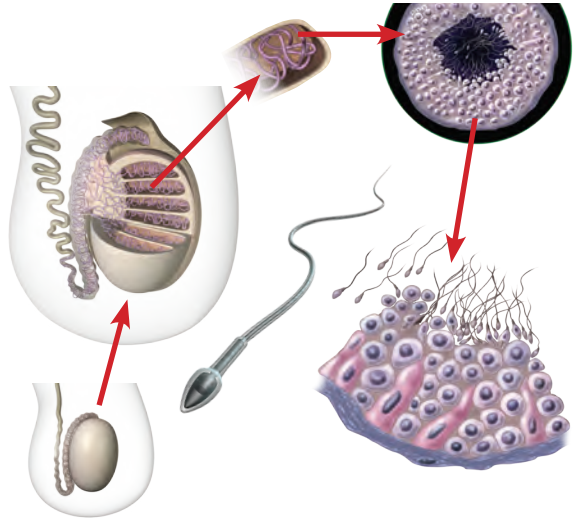


Epididymis

As sperm mature, they pass from the testes to the **epididymis**, which stores and nourishes the sperm. The epididymis is a tightly coiled tube located on the top of the testes. Stretched out, it would measure approximately six metres in length.

When the sperm enter the epididymis they have tails but are poor swimmers. As they travel along the epididymis they learn to become excellent swimmers within a couple of days.

It usually takes 10-15 days for the sperm to travel to the end of the epididymis before entering the **vas** or **vas deferens**.



The epididymis located on the top of the testes stores and nourishes the sperm

Vas deferens, seminal vesicles and ejaculatory ducts

The vas deferens or 'vas' is a long curving tube, which carries the sperm from the bottom end of the epididymis upwards into the groin. Here there are pouch-like glands, behind the bladder called the **seminal vesicles**, which join with the far end of the vas to form the **ejaculatory ducts**. These small ducts pass through the prostate to enter the back of the penis.

The seminal vesicles produce most of the fluid (semen) in the ejaculate. Their secretions are important in maintaining sperm movement. The sperm mixed with the semen is then expelled out of the penis during orgasm.

The entire process of sperm maturation, from their primitive beginnings in the testes to their fully mature form in the vas deferens, takes about 74 days.



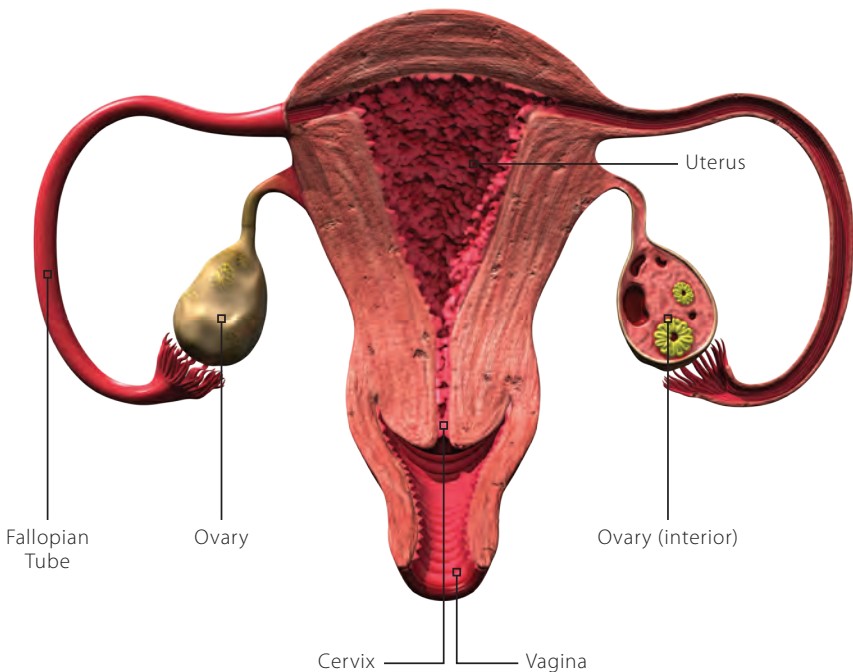
Prostate gland

The **prostate gland** – the largest of all the male reproductive glands – is chestnut sized and located just below the bladder. The prostate contributes a large amount of the seminal fluid, secreting a thin, milky-white alkaline fluid. The fluid is discharged into the **urethra** (tube running from the bladder to the end of the penis) during ejaculation. It helps neutralise the acidic fluids in the male urethra and the female vagina. This function is important because acids can have an adverse effect on sperm and, at higher concentrations, can kill them.

Creating a baby

Ovulation

Ovulation is the fertile period of a woman's menstrual cycle. The menstrual cycle refers to the maturation and release of an egg and to the preparation of the uterus (womb) to receive and nurture an embryo. On around day 14 of each menstrual cycle, one egg is released from a woman's ovary (a small almond shaped sac that contains eggs) into a fallopian tube. The egg (ovum) remains in the fallopian tube for a few days.

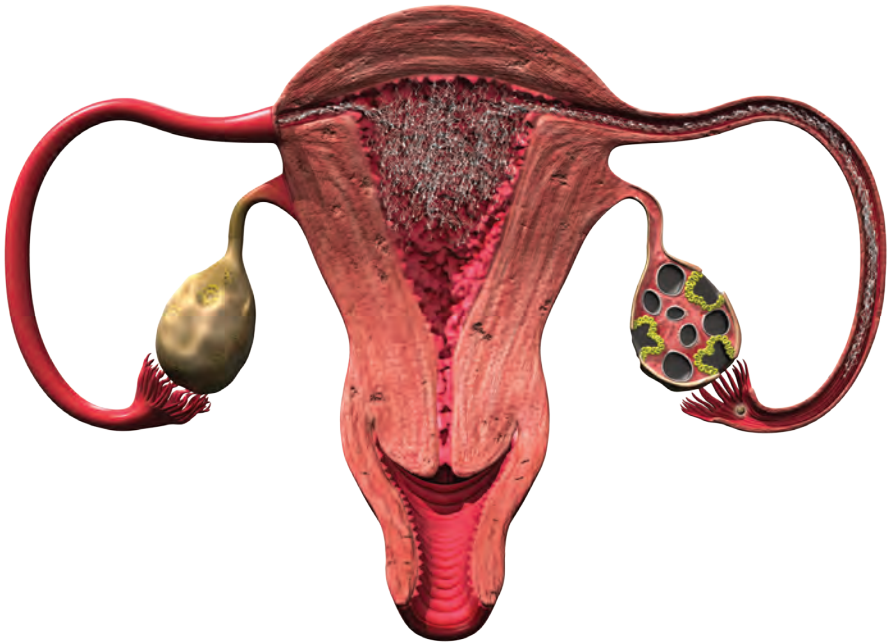


Journey of the sperm to the egg

During vaginal intercourse, the semen is deposited after ejaculation in the vagina close to the opening of the cervix (neck of the uterus). The semen then forms a clot that protects the sperm from the acidity of the vagina.

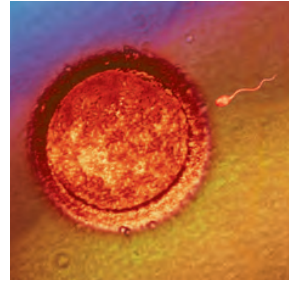
After about 10–20 minutes, this clot dissolves. The sperm rapidly enter the mucus that is secreted by the cervix. The sperm swim and enter the uterine cavity (womb) and then move into the fallopian tube. The sperm meet the egg at the far end of the fallopian tube near the ovary, as can be seen in the figure below.

From millions of sperm deposited in the vagina, only a couple of hundred reach the egg. Although several sperm will try to enter the egg, only one will succeed. The egg needs to be fertilised within 12 to 24 hours after ovulation, whereas the sperm can survive for two to three days in the woman.

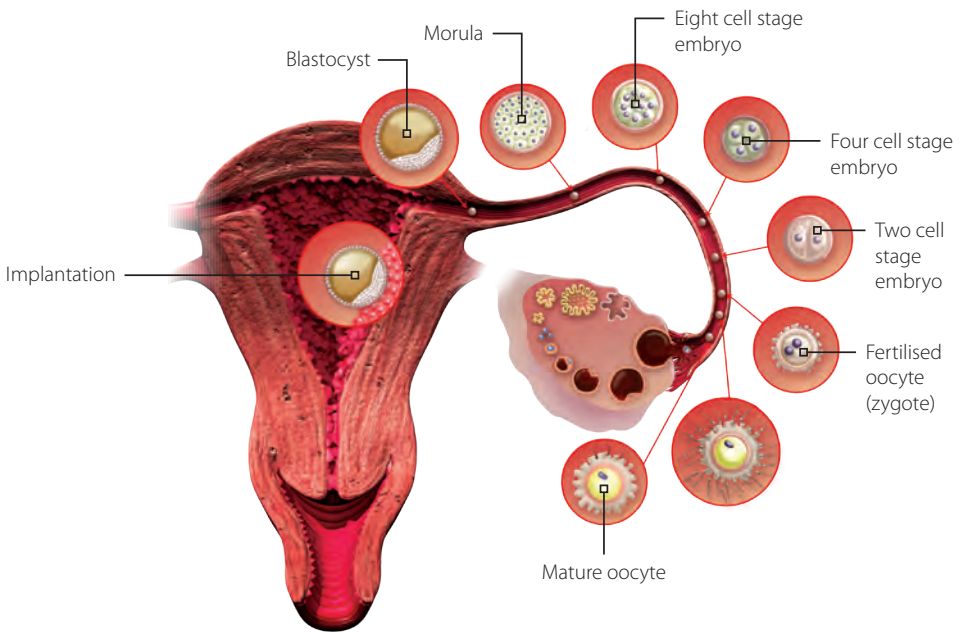


Egg fertilisation

After ovulation, the layers of cells that surround the egg act as a major barrier to sperm. The sperm change their movement to a forward thrust and release enzymes from their heads. They can then penetrate this barrier and bind to the egg. One single sperm can then travel through and enter the egg. As soon as this has occurred, the egg immediately reacts to prevent any further sperm from entering the egg. The DNA carried by the sperm head is then released and joins with the DNA of the egg.



If fertilisation occurs, the resulting embryo is held in the fallopian tube until it has developed into a small cell mass (blastocyst). The embryo is swept toward the uterus where pregnancy may be established by implantation in the uterus.



CAUSES OF MALE INFERTILITY

One of the most important tasks of your doctor is to try to establish the cause of a man's infertility. While it is often very difficult to establish the cause, actually knowing the reason for your infertility is both reassuring and indicates the best method of treatment to the doctor.

Lifestyle factors may impact infertility but for men the most common causes of infertility are:

- damage to sperm production – affects two thirds of infertile men⁵
- obstruction to the ducts leading out from a testis
- hormonal problems
- genetic problems.

Lifestyle changes

Certain lifestyle factors may impact your fertility in a negative way. You may like to check the following list of habits and consider what you can change in order to maximise your pregnancy chances.

- Stop smoking.** Smoking affects the development and quality of sperm, decreases the sperm count and reduces the volume of semen.⁶ Unfortunately, the damage that is done by smoking is often – but not always – irreversible. In addition, there is a higher risk of impotence (erectile dysfunction).⁶ For information and advice on how to stop smoking, visit Quit Now at www.quitnow.gov.au or call the Quitline on 137 848.
- Restrict alcohol intake.** Drinking alcohol affects sperm count, increases the number of abnormally shaped sperm, changes male hormones and can lead to impotence.⁷ If you choose to drink, the Australian Alcohol Guidelines advises that you should have no more than two standard drinks on any day.⁸
- Say no to drugs.** Illegal drugs such as cocaine, heroin and marijuana have been known to affect sperm count.^{7,9}
- Keep them cool.** Raising the temperature of the testicles can decrease sperm production and motility (the quality of movement).⁷ Testicles need to be at a slightly lower temperature than the rest of the body to maximise sperm production, so opt for boxers rather than briefs and avoid extremely hot baths, showers or spas.⁷ You may also like to avoid putting your laptop computer on your lap as this can overheat the testicles.⁷

- Well-balanced diet.** There is no special eating plan for maximising your fertility.

A sensible diet that includes plenty of fruit, vegetables, grains, meat, poultry and seafood is advised.

- Stay in a healthy weight range.** Overweight men may have decreased fertility. If you are overweight, losing weight may help increase your sperm count.⁷

- Exercise with caution.**

Prolonged cycling can cause damage due to the pressure on the testicles from the bike seat.⁷ There is also the risk of damage to the testicles from contact sport.⁷

- Cut back on caffeine.** The studies are divided on this subject, but even a modest amount of coffee (one or two cups daily) may decrease fertility and affect your sperm count.^{7,10} It may be best to try healthier alternatives such as herbal teas or decaffeinated varieties.



- Avoid using lubricants.** They often contain chemicals that can damage or kill sperm.

- Avoid toxins.** Jobs involving heavy metals, such as lead or mercury, chemicals in pesticides, or chemicals used in certain manufacturing processes (such as painting or printing) may damage sperm.¹¹

- Discuss your medications.** As some medications may affect your sperm count, please discuss with your doctor any prescription, over the counter medications or complementary therapies that you may be taking.

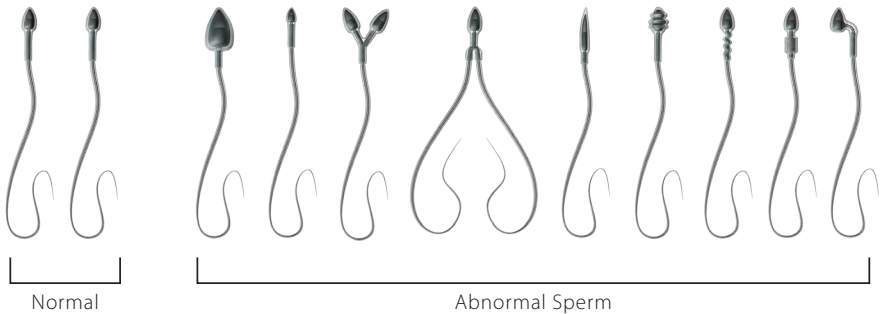
Sperm production problems

One of the commonest causes of infertility in the male is damage to the production of the sperm resulting in a **low sperm count** (oligospermia). This may also be associated with reduced sperm movement and abnormally shaped sperm (see explanation below). When severe, it can result in a **total absence of sperm** in a semen sample (also known as azoospermia). Common causes of damage to sperm production are testicular injury, undescended testes, a twisted testis (torsion), cancer therapy and genetic effects. This condition can also be a result of previous vasectomy (surgery for sterilisation) or obstruction.

Poor sperm motility (ability to move): A healthy sperm has a lashing tail, which helps it swim through the woman's reproductive system. Sperm with poor motility may swim feebly or not at all.

Abnormally shaped sperm: A healthy sperm is shaped like a streamlined tadpole. Those shaped differently may have problems penetrating the surface of the woman's egg. According to Andrology Australia, it is quite common for men to make a large number of abnormally shaped sperm.¹²

Most frequent sperm abnormalities



Recently it has been discovered that the Y chromosome, which is only present in men, may undergo deletion of very small amounts of genetic information.¹³ These are known as **micro-deletions** and are associated with loss of sperm production.¹³ These micro-deletions are the cause of infertility in up to 15% of men with low or absent sperm counts.¹³ An understanding of these genetic causes of infertility is important as they can be passed on to male offspring.¹³

Other causes of sperm production problems

1. The condition known as **varicocele** (swollen varicose veins of the scrotum), can also occasionally affect sperm quality and quantity. Unfortunately, varicocele is very common but only a few of the men with this condition are infertile.
2. Testicular cancer is much more common among infertile men, particularly those with testicular abnormalities. It frequently occurs between the ages of 16 and 30 years and the number of cases appears to be increasing. It is particularly common in men whose testicles have failed to descend and where there are signs of damage to sperm production.

While the quality of the sperm cannot be improved, modern techniques can increase the odds of conception by helping the existing quality sperm to fertilise the egg (see page 20 for more information).

Obstruction

Obstruction occurs when the fine tubes in the epididymis become blocked, preventing all sperm from one testis or both testes reaching the penis. Obstruction can be caused by infection, congenital disorders (e.g. poor development of the epididymal duct and vas), vasectomy and other surgery.

Functional problems

Functional problems can cause or be due to the following:

- impotence – inability to maintain an erection sufficient for sexual intercourse
- failure to ejaculate, premature ejaculation or ejaculating backwards into the bladder (retrograde ejaculation)
- side effects of prostate surgery
- presence of other diseases, such as diabetes and multiple sclerosis, can cause erection and ejaculation difficulties
- spinal cord injury preventing erection and ejaculation
- anti-sperm antibodies – the man's immune system makes antibodies that hinder the activity of the sperm.

Causes of male infertility (cont.)

Hormonal problems

According to Andrology Australia, hormonal causes are uncommon, affecting less than one in 100 infertile men.⁵ Sometimes the pituitary gland, located at the base of the brain, does not send the right messages to the testes. This results in low testosterone levels, which means that sperm are not produced.

A number of different endocrine disorders can cause a drop in the sperm count and these include thyroid disease, diseases of the pituitary gland, a blood disorder called haemochromatosis and other blood diseases such as sickle cell anaemia and thalassaemia.

Unexplained infertility

Unexplained (idiopathic) infertility is defined as not being able to conceive after one year, even though the cycle is normal, semen is normal, laparoscopic findings are normal and there is normal sperm-mucus penetration. Emotionally, this is the most frustrating and stressful diagnosis of all because there is no cause or management plan on which to focus. Depending on a woman's age, couples may continue to try to fall pregnant naturally, 'fast track' to assisted reproductive techniques or consider other options, such as adoption or living child-free.

There may be another reason for your infertility, which we have not discussed in this booklet. Ask your doctor for more information.

HOW IS INFERTILITY DIAGNOSED?

In most cases, both partners will be investigated for the cause of the infertility (even if one has had a child in a previous relationship). However, as men are responsible for fewer stages in the process of creating a baby, the testing to determine the cause of male infertility is much simpler and straightforward than for a woman.

For routine examinations, men can generally see their GP. A man having a problem with his prostate or who may require surgery will usually be referred to an **urologist** (specialises in the urinary tract) for evaluation.

Sometimes your GP may run some preliminary tests for both you and your partner or they may refer you to an **andrologist** (male reproduction specialist) or a fertility clinic. The first and most important part of the investigation of infertility is a detailed assessment of your medical history and a thorough clinical examination.

What are we testing for?

When evaluating a couple, a specialist is trying to determine which of the following five essential conditions required for pregnancy may not be functioning correctly.

Your doctor will check for:

1. The right balance of hormones to allow egg and sperm development and support.
2. A healthy mature female egg and whether ovulation takes place regularly.
3. A good quantity and quality of male sperm. There will be a decrease in fertility if the sperm are:
 - not being produced in adequate numbers (or not at all)
 - obstructed and cannot reach the outside world
 - not swimming very well
 - being identified and attacked as a foreign cell by antibodies produced by the male or female's immune system.
4. A functioning reproductive tract (uterus and fallopian tubes), which allows for the egg and sperm to meet and for the egg to be fertilised.
5. The ability of the female body to allow for implantation of an embryo and to maintain and nourish that embryo.

Initial examination and testing

Semen analysis (also called a 'sperm count'): Semen analysis is usually performed on a sample collected following a period of at least 36 to 72 hours without sex. It can be produced at your clinic or doctor's surgery or taken from home (as long as it arrives within two hours of production). The test gives a measurement of the number, movement (motility), size and shape of the sperm, and the volume of the ejaculation. The semen will also be tested for the presence of antibodies – produced by the immune system – which may cause the sperm to clump or lose their progressive motion. Samples may be characterised as potentially **fertile, sub-fertile** or **infertile**. The table below lists the World Health Organisation (WHO) criteria for normal semen analysis, which may be helpful when your doctor discusses your results.

Normal Semen Criteria WHO 2010 ¹²	Lower reference limit
Volume of semen	≥ 1.5 mL
Total No. of Spermatozoa	≥ 39 x 10 ⁶
Concentration	≥ 15 x 10 ⁶ /mL
Total Motility (PR & NP)	≥ 40%
Progressive Motility	≥ 32%
Morphological Normal Sperm	≥ 4%

PR: progressive motility, NP: non-progressive motility

Collecting a semen sample

For a correct semen analysis, the following is recommended:

1. Abstain from ejaculating two to three days before producing a sample.
2. The sample should be fresh (within the past two hours) and collected into a sterile container – not a regular condom as the rubber can damage the sperm.
3. The sample should be kept at a warm temperature (not be allowed to cool).

LOW SPERM COUNT

Despite a low sperm count, many men with high-quality sperm (viable and highly motile) may still be fertile.

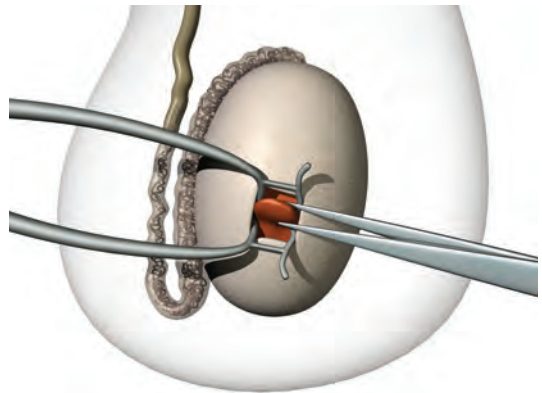


Ultrasound: An ultrasound examination of the testes and prostate can be useful. An ultrasound probe (slim wand) is placed on the testicles to provide a picture of the testes and the epididymis. It is also useful for diagnosing testicular cancer and varicocele (swollen varicose veins of the scrotum).

An ultrasound probe may also be passed into the rectum to examine for abnormalities of the prostate, seminal vesicles and the lower end of each vas.

Vasography: While not used very often these days, a vasography may be useful in diagnosing an obstruction in the vas and abnormalities of the seminal vesicles and the ducts that lead out into the back of the penis. Dye is injected into the vas via a small needle and an X-ray is taken to try to identify any obstructions.

Testicular biopsy: This involves the removal of a small sample of the tissue from a testis using either a general or, more commonly, local anaesthetic. It allows for a direct inspection of the sperm-making tissue. These days it is used less often, with doctors preferring careful clinical examination and hormonal evaluation to make a diagnosis.



It may take two or three visits to the clinic or specialist to complete the necessary tests, and between one to six months to establish a diagnosis.¹ Some of the tests may need to be repeated.¹

How might you feel?

Testing and diagnosis

The following are some of the common ways men feel as they are evaluated, diagnosed and treated for infertility. If you experience any of these normal feelings, know that you are not alone. Some of the coping methods on page 28 may be useful.

- Loss of control – a sense that tests and procedures are taking over your life.
- Anger at your body, your partner, or others who are pregnant or have children.
- Self-punishment – ‘What did I do to deserve this?’; ‘What could I have done differently?’.
- Self-doubt and feeling sexually inadequate.
- Shame and embarrassment over not functioning ‘normally’.
- Need for secrecy, resulting in loneliness and isolation from friends and family.
- Blame and guilt.
- Lack of privacy due to the invasive nature of tests and procedures.
- Shock, numbness and/or relief when a problem is confirmed.



YOUR TREATMENT OPTIONS

Discovering the medical reason for your infertility and beginning treatment as advised by your doctor is the beginning of a new and positive phase of your journey towards parenthood. However, it is also important to acknowledge that even with treatment, it may take some time for your partner to become pregnant. It can be a long, frustrating and emotional process and you and your partner should prepare yourselves for this (see page 28 for some suggested coping methods).

About 85% to 90% of infertility can be treated with conventional therapies, such as medication or surgery. Success rates are continually improving.¹⁴

Hormonal therapy

Hormonal (endocrine) problems are rare causes of infertility, with about one in 100 infertile men having this problem.⁵ An hormonal disorder occurs when there is a deficiency in the two hormones – luteinising hormone (LH) and follicle stimulating hormone (FSH) – that control testicular function. Hormonal imbalances that directly affect the development of sperm may be successfully treated by injections of hormone preparations called gonadotrophins. Usually the testes increase in size and produce testosterone in normal amounts. Sperm may appear in the semen after several months of treatment. Gonadotrophins are sometimes chosen to treat unexplained male infertility, as seen in the cases of oligozoospermia (when sperm count is abnormally low) or asthenospermia (when less than 40% of the sperm are motile).

Surgery

When infertility is caused by anatomical problems, obstructions or abnormalities found in the male reproductive system, all but the most severe cases can usually be corrected using a variety of surgical procedures. Often surgery is part of a more comprehensive approach and may be utilised in conjunction with other therapies.

Obstruction can be treated surgically with a bypass operation performed using an operating microscope.

Sometimes, the cause of infertility can be traced to past infections or inflammation that has left scarring or adhesions. This condition can often be surgically corrected to improve fertility.

Varicocele repair

A varicocele is a dilation (enlargement) of the veins of the scrotum. Pooling of blood in the testicle causes an increase in temperature, which may interfere with the testicle's production of sperm. Varicocele repair consists of tying or clipping the veins. This is performed through a small incision in the groin. Improvement can be seen in as little as three months, and further improvement may be seen for up to two years. Up to 60% to 80% of men with varicocele will note an improvement in their sperm production after surgical repair.^{15,16} Another treatment option is **embolisation**, which is a non-surgical, minimally invasive technique that blocks the faulty vein. By embolising the vein, blood flow is re-directed to other healthy pathways.

Vasectomy reversal

Vasectomy reversal, which repairs a surgically removed section of the vas deferens (sperm duct), is called a vasovasostomy. This is a fairly quick operation, usually lasting around two hours. Postoperative care includes careful monitoring of the healing process and, after six to eight weeks, monthly semen analyses to note improvements in sperm count and motility.

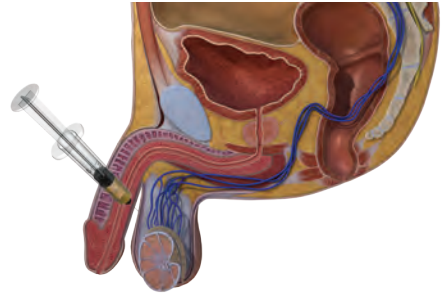
The results of a vasectomy reversal depend on how long ago the procedure was done. If 10 years or more have passed since the vasectomy, the chance of having sperm reappearing in the semen after a reversal is greatly reduced.¹⁷

Assisted reproductive technology (ART)

Assisted reproductive technology (ART) is a general term referring to methods used to unite sperm and eggs by artificial or partially artificial means. Your doctor may recommend you try one of these techniques to help your partner become pregnant. They do not cure or treat the cause of male infertility, but they can help you and your partner conceive even when the sperm count is very low.

Surgical sperm extraction

Azoospermia is the condition where a man does not have any sperm in his ejaculated semen even though he may be producing sperm. When sperm cannot move through a man's genital tract because of blockage, or if there is a mechanical problem with them getting to where they need to be, sperm can be surgically extracted from the epididymis or testicular tissue, where they are stored. An urologist or andrologist usually performs these procedures. Fertilisation is then attempted by placing the sperm and the egg together either in the laboratory or by injecting the sperm into the female partner (see further information page 22).



Procedures to extract sperm include the following.

Testicular sperm aspiration (TESA): A fine needle is passed through the skin of the scrotum into a testis in order to extract sperm tissue. Sperm are then painstakingly retrieved from the tissue. This is usually performed a number of times in different parts of the testes, until an area of reasonable sperm production is found. Depending upon how difficult it is expected to be to find sperm, the procedure may be done under a local or general anaesthetic. Although this technique is simple to perform, it yields very few sperm.

Percutaneous epididymal sperm aspiration (PESA): PESA is a simple technique to obtain sperm in men who have an obstruction of the vas deferens, either due to vasectomy or other obstruction. It is done under local or general anaesthesia and involves inserting a needle attached to a syringe into the epididymis and then gently extracting sperm-containing fluid.

Microsurgical epididymal sperm aspiration (MESA): This procedure is often used when PESA has been unsuccessful. MESA is performed in an operating room under local or general anaesthesia. It involves opening up the ducts of the epididymis and extracting fluid or a piece of testicular tissue in order to extract live sperm (rather than just extracting fluid through a fine needle as is done with PESA).

Testicular sperm extraction (TESE): This procedure is used when there is an absence of sperm in the epididymis or if there is no epididymis. TESE is performed in an operating room under local or general anaesthesia. It involves making a small incision and removing a piece of testicular tissue in order to obtain sperm. After the operation there will be some pain and bruising, which can usually be easily controlled with pain relief and rest.

Surgical sperm extraction (cont.)

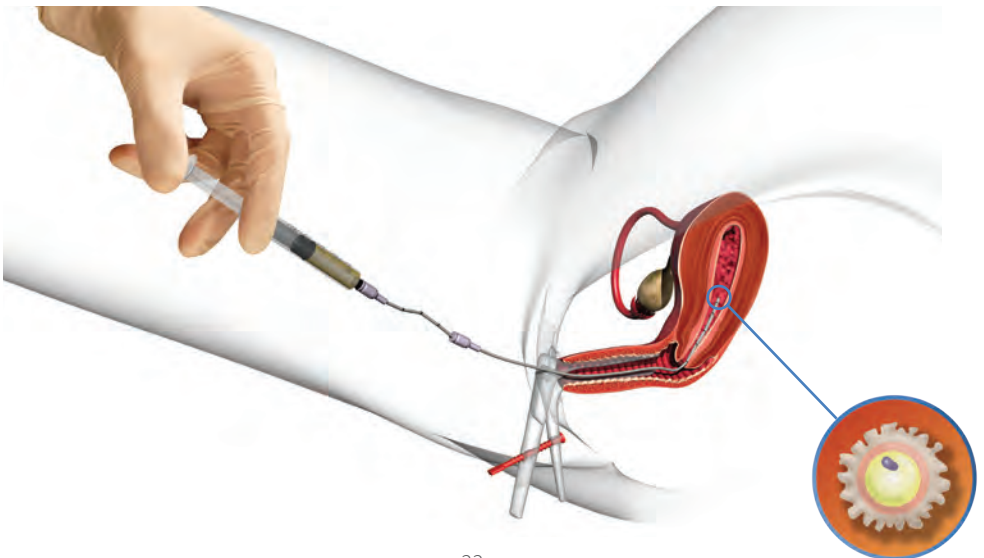
Vibrostimulation and electroejaculation: Men with spinal cord injuries, neurological disorders and ejaculation problems can use these techniques to obtain a semen sample. Vibrostimulation uses a special vibrator applied directly to the penis to produce an ejaculation. In electroejaculation, a special probe is inserted into the rectum to stimulate the pelvic nerves and cause ejaculation.

Another extraction approach to this problem is the **collection of sperm from the vas**. When successful this may yield many millions of sperm.

With any of these extraction or stimulation techniques, there is a small possibility that no viable sperm will be found.

Artificial insemination (AI) & intrauterine insemination (IUI)

Artificial insemination (AI), is a procedure in which the sperm are placed directly into a woman's reproductive tract. A common AI procedure is **intrauterine insemination (IUI)** in which sperm are inserted directly into the uterus around the time of ovulation to assist their journey to the egg. The procedure is often combined with the female partner taking fertility drugs.



IUI is commonly used when there may be problems with semen volume, concentration or motility (movement). The sperm are 'washed' – separated from the liquid part of the semen to remove hormones and other substances – and then inserted into the cervix (neck of the uterus). When sperm quality is lower, sperm are inserted higher up the reproductive tract to reduce the distance they have to travel to reach the egg.

FREEZING SPERM FOR LATER USE

If more sperm are found than is required, and their quality is reasonable, they may be frozen and stored in liquid nitrogen for future use in a process called cryopreservation (a storage fee may apply). There does not appear to be any differences in the rates of abnormalities or birth defects among children conceived with fresh versus frozen sperm.¹⁸

Donor insemination

IUI can also be done using donor sperm, either from an anonymous or a known sperm donor (known as DI or donor insemination). Insemination with donor sperm is used when the male partner does not produce sperm, when the sperm are of very poor quality or if there is a high risk of passing on genetic diseases. Donor sperm are used less frequently these days because of the improvement in techniques which can retrieve viable sperm (e.g. sperm extraction, see previous pages).

Donor sperm are usually frozen ahead of time and screened for sexually transmitted diseases (e.g. HIV/AIDS) and any genetic disorders. The semen selected for a couple closely matches, as much as possible, the male partner's characteristics, e.g. eye and hair colour, height and build.

Many clinics will allow couples to reserve semen for a subsequent pregnancy, so that if they have a child from insemination, they can try for another child with the same genetic characteristics (i.e. from the same donor). There are many other factors to consider, such as whether to tell friends or family about using donor sperm and whether the child should know about their origins as they grow up. **AccessAustralia** and the **Donor Conception Support Group** have many resources on the issues relating to donor insemination (see contact details page 29). Also see the *How might you feel?* box on the next page.

How might you feel?

Using donor sperm

Before you agree to use donor sperm, it is important for you to explore how you truly feel about it. For example, the child created will be genetically related to only one of you. This may result in feeling like your masculinity or even your relationship is threatened and that you are no longer part of the conception/pregnancy process. On the contrary, you will be there from the point of insemination right through to raising your child. Providing sperm does not automatically mean you will be a good father. Being a parent is about passing on your values, love, wisdom and experience.

It is a good idea to discuss your emotions and concerns with a counsellor available through your fertility clinic or as recommended by your doctor.

In vitro fertilisation (IVF)

***In vitro* fertilisation (IVF)** was the first ART (Assisted Reproductive Technology) procedure and is still one of the most commonly used. During an IVF cycle, eggs and sperm are collected and placed together in a laboratory dish to allow the sperm to fertilise the egg. Hormonal medications are usually used to help stimulate the development of as many eggs as possible. If the eggs are successfully fertilised in the laboratory, they are transferred into the woman's uterus. Ideally, one of the fertilised eggs will implant and develop, just as in a routine pregnancy.

IVF is a four-stage process.

Stage 1: Ovarian stimulation, monitoring, and ovulation triggering

Having a greater number of mature eggs available for fertilisation increases the chances of pregnancy. Since a woman's body normally releases only one mature egg every month, certain medications are used to prevent an early release of eggs, while other medications are used to stimulate the ovaries to develop more ovarian follicles. The medications also control the timing of ovulation to make it easier to retrieve the eggs.

Stage 2: Egg retrieval (Egg Pick Up [EPU])

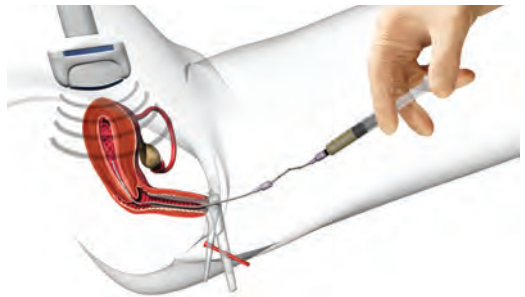
Once ovarian stimulation is complete and follicles have matured, your doctor will try to retrieve as many eggs as possible, although all the eggs may not be used in the current IVF cycle. Egg retrieval is performed under mild sedation, local anaesthesia or, in some cases, general anaesthesia. The mature follicles are identified using ultrasound, and then a needle is passed through the vagina to withdraw the fluid from the mature follicle with gentle suction. The fluid is immediately examined under a microscope to see if an egg has been retrieved. The process is repeated for each mature follicle in both ovaries. All retrieved eggs are removed from the follicular fluid and placed in an incubator.

Stage 3: Fertilisation

About two hours before the eggs are retrieved, a semen sample is collected from the male partner and processed to select the strongest, most active sperm. Previously extracted sperm or donor sperm may also be used. The sperm are then placed with the eggs in an incubator set to the same temperature as a woman's body. The next day, the eggs are examined under a microscope to determine whether fertilisation has occurred. If it has, the resulting embryos will be ready to transfer to the uterus a few days later.

Stage 4: Embryo transfer

Embryo transfer is not a complicated procedure and can be performed without anaesthesia. The embryos are placed in a tube and transferred to the uterus. The number of embryos transferred depends on a woman's age, cause of infertility, pregnancy history and other factors. If there are additional embryos that are of good quality, they may be frozen (cryopreservation) for later use.



USING YOUR OWN SPERM FOR IVF

Unless you have a very low sperm count or extremely poor sperm quantity, your sperm can probably be used during the IVF process. Your sperm will be washed and concentrated and specially treated in a laboratory to enhance their ability to fertilise an egg.

If you have poor sperm function, you may be required to produce several semen samples over a few days so that enough good quality sperm can be collected.

Intra-cytoplasmic sperm injection (ICSI)

Intra-cytoplasmic sperm injection (ICSI) is a procedure done under a microscope, whereby a single sperm is injected into the centre of the egg. If the egg is fertilised, the embryo is inserted into the uterus. As this technique also requires the collection of eggs, it is usually called IVF/ICSI.

ICSI has revolutionised the management of many forms of male infertility that were previously untreatable. It means that there is no need for sperm to swim up the female reproductive tract or try to enter the egg from the outside.



Provided the sperm are viable, even sperm dysfunction may be overcome, since more than 50% of eggs fertilise normally regardless of the sperm quality.

Other ART

These days, GIFT and ZIFT are seen as less efficient, more expensive and physically demanding when compared to IVF.

Gamete intro-fallopian transfer (GIFT): Sperm and eggs are placed directly into the fallopian tubes where fertilisation can occur.

Zygote intra-fallopian transfer (ZIFT): Fertilised eggs are placed in the fallopian tubes at a certain stage of embryo development (zygote).

Success rates

According to the latest figures from the University of New South Wales, there were 70,082 assisted reproductive technology (ART) treatment cycles undertaken in Australian and New Zealand in 2012.¹⁹ Of these cycles, 17.9% resulted in a live delivery (the birth of at least one liveborn baby).¹⁹ In total, 13,312 liveborn babies were born following ART treatment undertaken in 2012.¹⁹

If you decide to proceed with an assisted reproductive technology, please bear in mind that just as with a naturally conceived pregnancy, many things can go wrong. The decision about choice of treatment requires careful thought and discussion with your doctor. Some of the problems associated with the use of assisted reproductive technologies include:

- associated risks of multiple pregnancies
- increased risk of caesarean delivery
- increased risk of premature labour and low birth weight
- ovarian hyperstimulation syndrome

Male infertility in summary

Condition	Causes	Tests	Treatment
Sperm production problems , e.g. absent sperm, low sperm count, poor motility or abnormally shaped	<ul style="list-style-type: none"> genetic defects undescended testes twisted testicle physical injury to testes varicocele (swollen varicose veins) hormonal problems (see below) testicular cancer lifestyle factors, e.g. smoking, alcohol 	<ul style="list-style-type: none"> semen analysis ultrasound, e.g. to detect testicular cancer or varicocele testicular biopsy 	<ul style="list-style-type: none"> Surgery to repair varicocele or vasectomy reversal ART, e.g. surgical sperm extraction; IUI; IVF; ICSI Change in lifestyle habits
Obstruction , e.g. of the epididymis or vas deferens	<ul style="list-style-type: none"> vasectomy/surgery infection genetic disorders 	<ul style="list-style-type: none"> ultrasound vasography 	<ul style="list-style-type: none"> Surgery for vasectomy reversal or bypass surgery ART, e.g. surgical sperm extraction; IUI; IVF; ICSI Change in lifestyle habits
Functional problems , e.g. impotence (inability to maintain an erection) and failure to ejaculate	<ul style="list-style-type: none"> side effects of prostate surgery other diseases such as diabetes and multiple sclerosis spinal cord injury antibodies (produced by the immune system) 	<ul style="list-style-type: none"> semen analysis ultrasound 	<ul style="list-style-type: none"> ART, e.g. surgical sperm extraction; IUI; IVF; ICSI
Hormonal problems	<ul style="list-style-type: none"> low testosterone levels meaning sperm are not produced 	<ul style="list-style-type: none"> blood tests semen analysis 	<ul style="list-style-type: none"> Hormonal medication, i.e. gonadotrophins
Unexplained infertility	<ul style="list-style-type: none"> unknown 		<ul style="list-style-type: none"> In some cases, hormonal medications and assisted technologies may be tried

COPING EMOTIONALLY

A diagnosis of infertility carries intense emotional and social burdens. Self-esteem, dreams for the future and relationships with others may all be affected. Some of the following coping strategies may be helpful.

Coping strategies:

- Acknowledge your feelings and find ways to deal with strong emotions through stress relief, e.g. regular exercise, massage, your usual social activities and interests.
- Communicate fears and emotions to your partner regularly. However, you might like to discuss the need to set some boundaries on how much time you spend talking each day about your diagnosis and treatment. Allowing for regular 'mental breaks' from the topic can be a good idea.
- Support one another, but understand that at times this will be difficult and you may feel differently about certain experiences and issues.
- Invest time in your relationship. Do things that you enjoy doing as a couple and remind yourself that you have a life together beyond trying to become parents.
- Look after yourself. Cut down on stressful activities, exercise regularly, eat well, nurture yourself with things that you like doing.
- Try sharing your problem with supportive friends or family members. If this is difficult for you, find a counsellor or psychologist through your fertility clinic to talk to about your feelings, concerns and hopes. There may also be an appropriate support group, available through AccessAustralia and the other organisations listed on page 29 of this booklet.



Being diagnosed and treated for infertility can be a traumatic time for both of you. However, it is quite common for the experience to strengthen a relationship. A couple may find a new sense of security, and you may realise that you can truly depend on your partner despite the uncertainties you face. Infertility is a couple's problem, and it's best to approach it as a team.

SUPPORT ORGANISATIONS

AUSTRALIA

AccessAustralia

www.access.org.au

Ph: 1800 888 896; Email: info@access.org.au

AccessAustralia is a national organisation, which provides numerous services and resources for people having difficulty conceiving. Its services include:

- fact sheets, newsletters and personal stories
- putting you in contact by phone or email with others sharing a similar infertility experience
- a register of infertility self-help groups
- listing of infertility clinics accredited by the Reproductive Technology Accreditation Committee (RTAC)
- listing of professional infertility counsellors across Australia
- lobbying governments for equal access to affordable, quality assisted conception treatment.

Andrology Australia

www.andrologyaustralia.org

Ph: 1300 303 878;

Email: info@andrologyaustralia.org

Andrology Australia provides factsheets, journal articles and the latest news on male reproductive health.

Donor Conception Support Group

<http://www.dcsupport.org.au>

Email: dcsupport@hotmail.com

The Donor Conception Support Group of Australia is a self funding organisation run by volunteers. Its members include those who are considering or using donor sperm, egg or embryo, those who already have children conceived on donor programmes, adult donor offspring and donors. It offers a newsletter, information nights, a library of books and articles and telephone support.

Endometriosis Care Centre of Australia

www.ecca.com.au

Formed by a group of health specialists, this organisation provides patient information and a state by state 'find a specialist' search engine on its website.

Endometriosis Australia

admin@endoaustralia.org

www.endometriosisaustralia.org/#!/links/c1bfb provides information on state contacts.

Endometriosis Australia endeavours to increase recognition of endometriosis, provide endometriosis education programs, and help fund endometriosis research. They strive to build strong relationships with existing endometriosis support networks throughout the country.

SANDS

SANDS is a self-help support group comprised of parents who have experienced the death of a baby through miscarriage, stillbirth, or shortly after birth. It provides 24-hour telephone support, information resources, monthly support meetings, name-giving certificates and other support.

Vic

www.sandsvic.org.au

Ph: (03) 9899 0218 (support) or (03) 9899 0217 (admin); Email: info@sandsvic.org.au

Qld

www.sandsqld.com

Ph: 1300 072 637 (support) or (07) 3254 3422; Email: admin@sandsqld.com

SA

www.sandssa.org

Ph: 0417 681 642;

Email: support@sandssa.org (quick response) or info@sandssa.org (general query)

SUPPORT ORGANISATIONS

NEW ZEALAND

FertilityNZ

www.fertilitynz.org.nz

Ph: 0800 333 306;

Email: support@fertilitynz.org.nz

FertilityNZ is New Zealand's national network for those seeking support, information and news on fertility problems. It provides various services including:

- regional support and contact groups
- general advice and contact service
- comprehensive information brochures
- a forum for confidential feedback on any issues or concerns
- a chatroom where you can seek on-line support from people in similar situations.

Endometriosis New Zealand

www.nzendo.co.nz/

Ph: 0800 733 277 (free phone support line);

Email: info@nzendo.org.nz

Endometriosis New Zealand promotes awareness of endometriosis, provides information, education and raises funds to support endometriosis related initiatives. It includes disease information specifically designed for teenagers, a support group network, regular seminars and workshops and a free phone support line.

SANDS New Zealand

www.sands.org.nz

Ph: 0800 726 374;

Email: contact@sands.org.nz

The website www.fertility.com has a wealth of information tailored to three different stages of a couple's journey. In addition to personal stories and frequently asked questions, it offers a number of practical 'tools' to assist you, including an ovulation calculator, a questionnaire and advice on your most appropriate coping method.

REFERENCES

- 1 Assisted Conception Taskforce (ACT) *Trying to have a baby. Your step-by-step guide to assisted conception*. Available online: http://www.assistedconception.net/resources/ACT_Ratgeber.pdf downloaded 20/12/13
- 2 Speroff L, Glass RH, Kase NG. *Clinical Gynecologic Endocrinology and Infertility*. 5th ed. Baltimore, MD: Williams & Wilkins; 1994.
- 3 AccessAustralia. Have you been trying to get pregnant fact sheet. Available online: <http://www.access.org.au/wp-content/uploads/2010/01/14.pdf> downloaded 20/12/13.
- 4 Cardone BRS, Harrington N. *Treatment of the Infertile Couple in My OB/GYN Practice: Is it Feasible?* Norwell, MA: Serono Symposia, USA; 1992.
- 5 Andrology Australia. Male Infertility - Symptoms and Causes. Available online: <https://www.andrologyaustralia.org/fertility-problems/> downloaded 1/6/2015.
- 6 Quit Now factsheet. Smoking and Male Reproductive System Damage. Available online: <http://www.quitnow.gov.au/internet/quitnow/publishing.nsf/Content/malereprod> downloaded 1/6/2015
- 7 Perkins S, Meyers-Thompson. *Infertility For Dummies*. Wiley Publishing Inc. 2007
- 8 National Health and Medical Research Council. Australian Guidelines to Reduce Health Risks from Drinking Alcohol 2009. Available online: <http://www.nhmrc.gov.au/health-topics/alcohol-guidelines> downloaded 1/6/2015
- 9 Prof. Robert Jansen. *Getting pregnant*. Allen & Unwin. 2003
- 10 Susan Warhus, M.D. *Fertility DeMystified*. McGraw Hill. 2007
- 11 Andrology Australia. Male infertility - Management and Support. Available online: <https://www.andrologyaustralia.org/fertility-problems/> downloaded 1/6/2015
- 12 WHO laboratory manual for the Examination and processing of human semen. 2010, Fifth Edition, World Health Organisation.
- 13 Cram DS, Osborne E, McLachlan RI. Y chromosome microdeletions: implications for assisted conception. *Med J Aust* 2006;185(8):433-434.
- 14 American Society of Reproductive Medicine. *Quick facts about infertility*. Available online: <http://www.asrm.org/detail.aspx?id=2322> downloaded 20/12/13
- 15 Cornell Institute for Reproductive Medicine, Center for Male Reproductive Medicine and Microsurgery. *Varicocele*. Available online: <http://www.maleinfertility.org/new-varicocele.html> downloaded 20/12/13
- 16 Pryor JL, Howards SS: *Varicocele*. *Urol Clin North Am* 1987;14:499-515.
- 17 Andrology Australia. Vasectomy - Vasectomy Reversal. Available online: <https://www.andrologyaustralia.org/your-health/keeping-fertile/vasectomy> downloaded 20/12/13
- 18 City Fertility Centre. Sperm Freezing. Available online: <http://www.cityfertility.com.au/fertility-services/fertility-preservation/sperm-freezing> downloaded 20/12/13.
- 19 Macaldowie A, Wang YA, Chambers GM & Sullivan EA 2013. Assisted reproductive technology in Australia and New Zealand 2012. Sydney: National Perinatal Epidemiology and Statistics Unit, the University of New South Wales.

Looking for more information?

Other booklets in the *Pathways to Parenthood* series are available at merckserono.fertilityportal.com.au:

- Your step by step guide to treating infertility
- Female infertility & assisted reproductive technology (ART)
- Endometriosis
- Polycystic ovary syndrome (PCOS)
- Ovulation induction (OI)
- Intrauterine insemination (IUI)
- *In vitro* fertilisation (IVF) & intra-cytoplasmic sperm injection (ICSI)
- Managing the stress of infertility