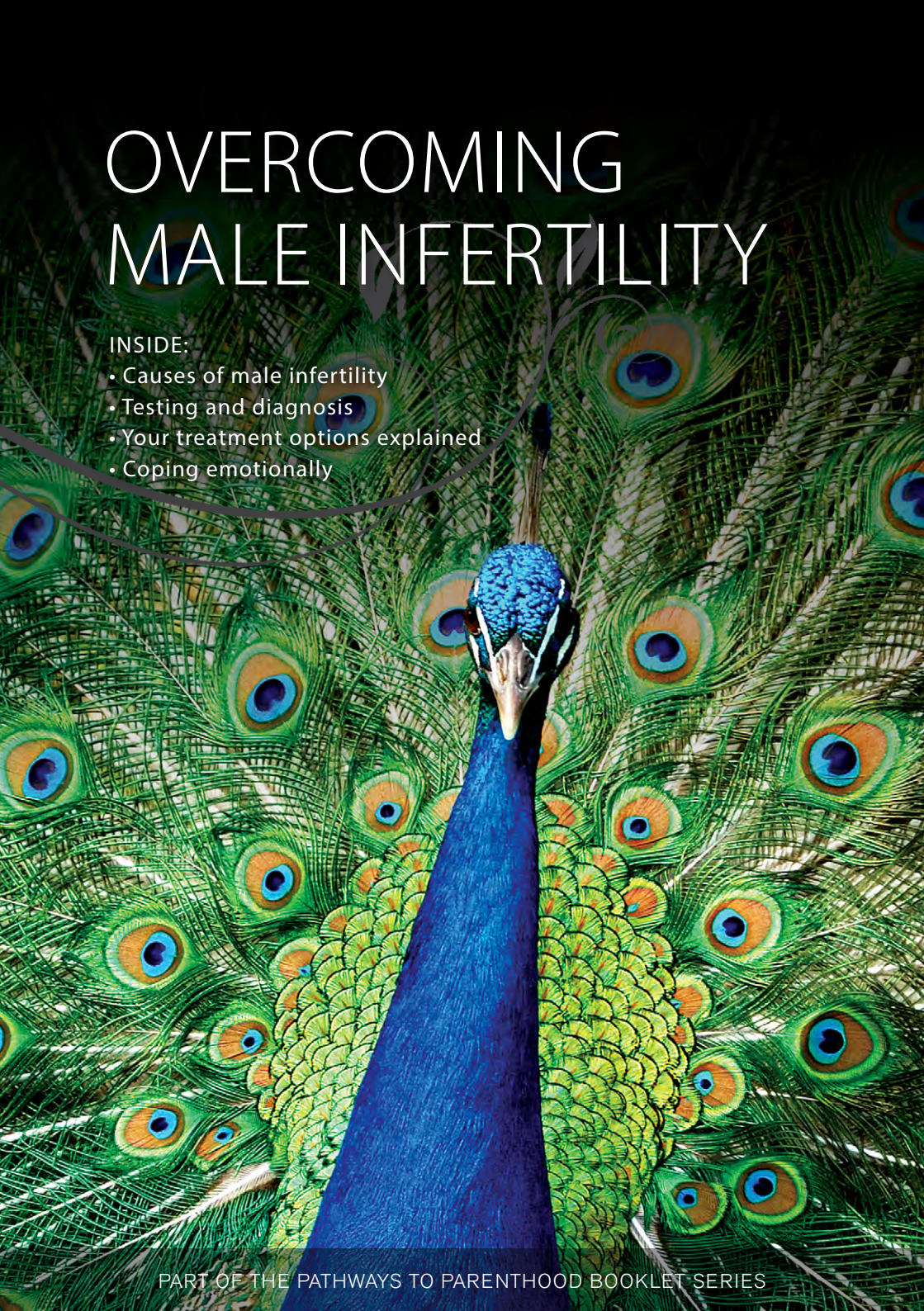
OVERCOMING MALE INFERTILITY

INSIDE:

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



PART OF THE PATHWAYS TO PARENTHOOD BOOKLET SERIES

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 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. Merck acknowledges the kind contribution of Dr Hassam Elzeiny in the preparation of this booklet.

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 circumstances.

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

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. Now is the time to 'attack the problem' 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?[1,2]

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. 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.

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. In the rest of the cases, fertility problems remain unexplained or are linked to both partners, resulting in both requiring some form of treatment.

A woman's age is the most important factor that impacts fertility. A woman's fertility will begin to decline (the quality and quantity of viable eggs) from age 35 years onwards. 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]

- 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[4]

To give yourselves the best chance of falling pregnant, it is recommended you have unprotected intercourse every two to three days. 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 www.fertilityportal.com.au/merck

THE MALE REPRODUCTIVE SYSTEM

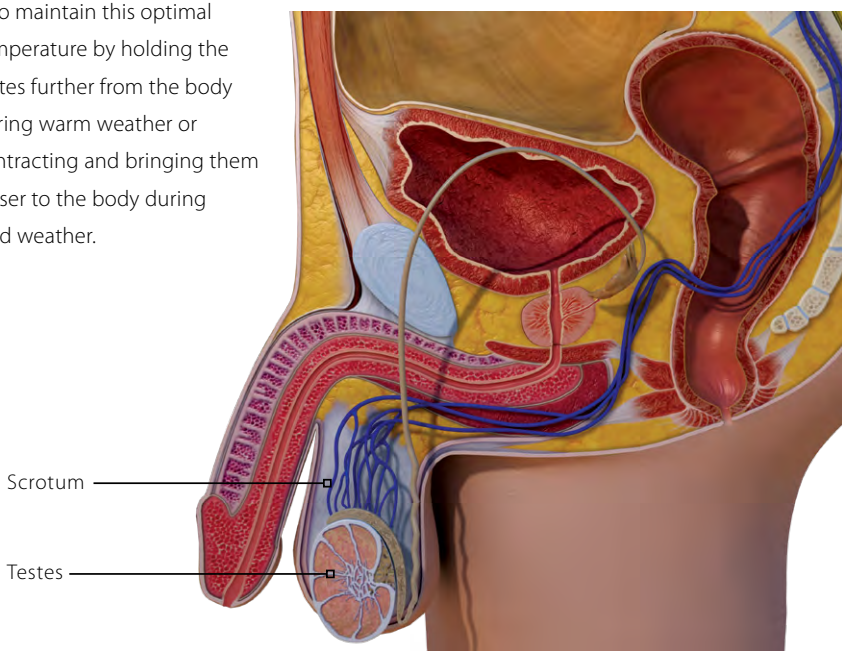
Before we discuss how infertility is diagnosed, the causes and treatment, it may be helpful to understand how the male reproductive system works and how sperm are produced.

Sperm production[5,6]

Testes[5,6]

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 2°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.

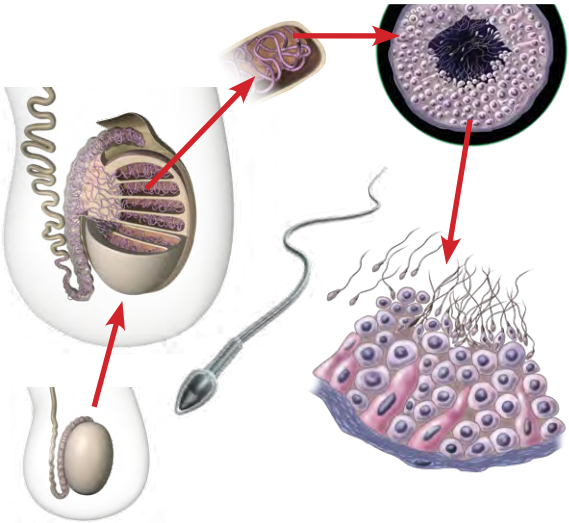


Adapted from: Boron WF and Boulpaep EL, 2012.[6]

Epididymis[5,6]

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

Adapted from: Boron WF and Boulpaep EL, 2012 (Chapter 54).[6]

Vas deferens, seminal vesicles and ejaculatory ducts[5,6]

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.

Adapted from: Boron WF and Boulpaep EL, 2012.[6]

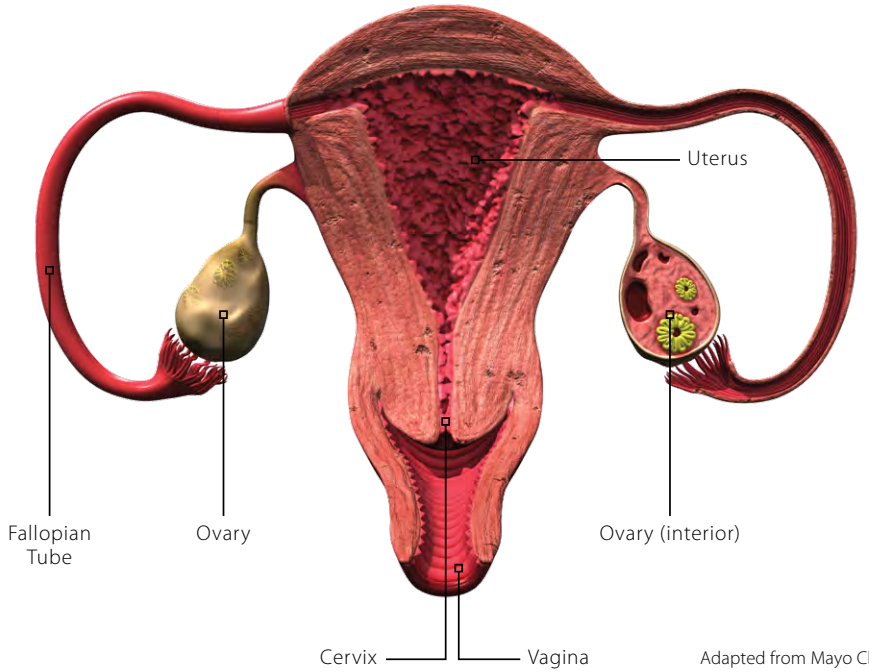
Prostate gland[5,6]

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[7,8]

Ovulation[7]

Ovulation is the fertile period of a woman's menstrual cycle. The menstrual cycle refers to the maturation and release of an egg from the ovary, 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.



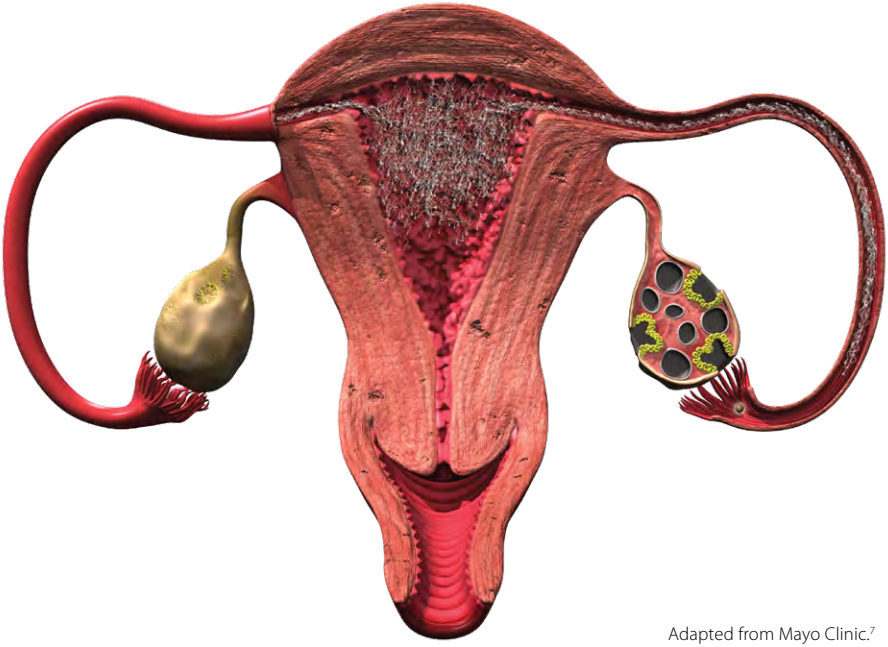
Adapted from Mayo Clinic.[7]

Journey of the sperm to the egg[7,8]

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.

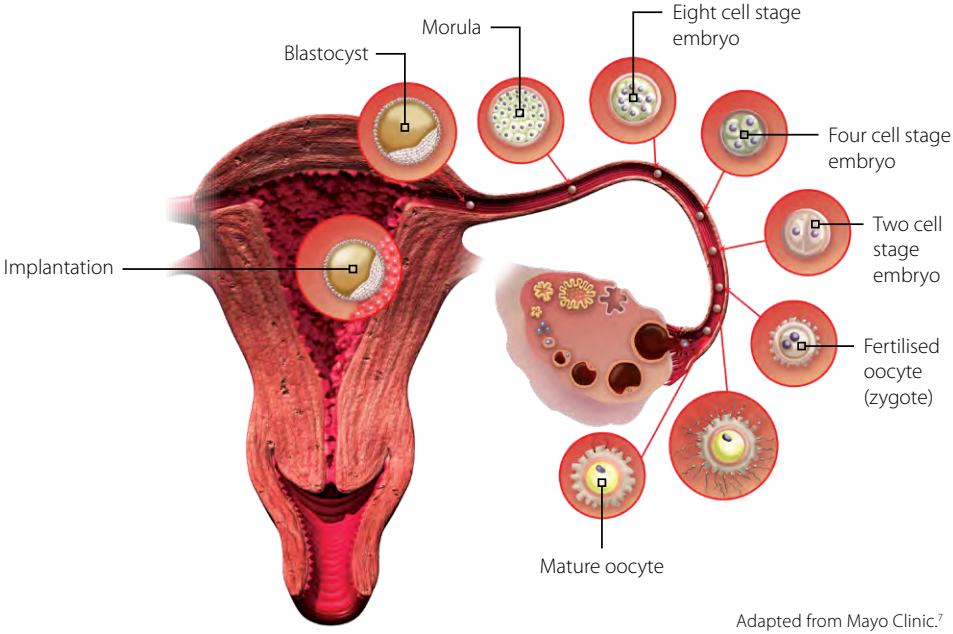


Adapted from Mayo Clinic.[7]

Egg fertilisation[7,8]

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. After three days, the embryo enters the uterus and continues to develop. By days 5–6 of development, the embryo (now called a blastocyst) will be ready to implant in the uterus and establish pregnancy.



Adapted from Mayo Clinic.[7]

CAUSES OF MALE INFERTILITY[4,9,10]

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 your doctor.

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

- lack or absence of sperm production – affects two thirds of infertile men
- obstruction to the ducts leading out from a testis
- hormonal changes
- genetic changes

Lifestyle changes[4,9,10]

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. 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). 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. If you choose to drink, you should discuss it with your doctor.

☐ **Say no to drugs**. Illegal drugs such as cocaine, heroin and marijuana have been known to affect sperm count.

☐ **Keep them cool**. Raising the temperature of the testicles can decrease sperm production and motility (the quality of movement). 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. You may also like to avoid putting your laptop computer on your lap as this can overheat the testicles.

☐ **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.

☐ **Exercise with caution**. Prolonged cycling can cause damage due to the pressure on the testicles from the bike seat. There is also the risk of damage to the testicles from contact sport.

☐ **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. You could try 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.

☐ **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.

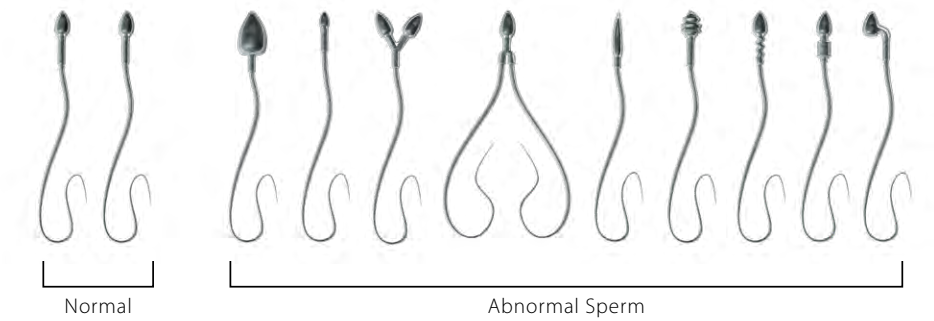
Sperm production problems[9–11]

One of the most common causes of infertility in the male is lack of sperm production resulting in a **low sperm count** (oligospermia). This may also be associated with reduced sperm movement (athenospermia) and abnormally shaped sperm (teratospermia; 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 lack of sperm production are testicular injury, undescended testes, a twisted testis (torsion), cancer therapy and genetics. 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 to reach the egg in the fallopian tube. 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 the World Health Organization, it is quite common for men to make a large number of abnormally shaped sperm.

Most frequent sperm abnormalities



Adapted from World Health Organization, 2010.[12]

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. These are known as **micro-deletions** and are associated with loss of sperm production. These micro-deletions are the cause of infertility in up to 15% of men with low or absent sperm counts. An understanding of these genetic causes of infertility is important as they can be passed on to male offspring.

Other causes of sperm production problems[9–11]

1. The condition known as **varicocele** (swollen varicose veins of the scrotum), can also occasionally affect sperm quality and quantity.
2. Testicular cancer can also cause changes to sperm production. 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 22 for more information).

Obstruction[9–11]

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[9–11]

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.

Hormonal problems

According to Andrology Australia, hormonal causes are uncommon, affecting less than one in 100 infertile men. 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[9–11]

Unexplained (idiopathic) infertility is defined as not being able to conceive after one year of unprotected intercourse, even though the cycle is normal, semen is normal, laparoscopic findings are normal and there is normal sperm-mucus penetration. Emotionally, this may be 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 many more reasons for infertility, which we have not discussed in this booklet. Ask your doctor for more information.

HOW IS INFERTILITY DIAGNOSED?[9–11]

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 do the tests measure?[9–11]

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[9–11]

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 Organization (WHO) criteria for normal semen analysis, which may be helpful when your doctor discusses your results.

Normal Semen Criteria WHO 2010[12]	Lowest level for fertility
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[10]

For a correct semen analysis, you will need to follow the instructions of your healthcare professional. It may include the following:

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).

Adapted from World Health Organization, 2010.[12]

LOW SPERM COUNT[10]

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

Scrotal ultrasound: This test uses high-frequency sound waves to produce images of your testicles and supporting structures to help your doctor see if there is a varicocele or other problems.[13]

Hormone testing: Abnormalities in hormonal or organ systems might contribute to infertility. A blood test measures the level of testosterone and other hormones.[13]

Post-ejaculation urinalysis: This tests for sperm in your urine can to see if your sperm are traveling backward into the bladder instead of out your penis during ejaculation (retrograde ejaculation).[13]

Genetic tests: Low concentrations of sperm may have a genetic cause. A blood test can detect signs of a genetic abnormality and genetic testing can diagnose various congenital or inherited syndromes.[13]

Testicular biopsy: This involves removing samples from the testicle with a needle. A normal sperm production result can indicate that the problem is likely caused by a blockage or another problem with sperm transport.[13]

Specialised sperm function tests: These tests check how well your sperm survive after ejaculation, how well they can penetrate an egg and whether there's any problem attaching to the egg.[13]

Transrectal ultrasound:
This involves the insertion of a small, lubricated wand into your rectum. It allows your doctor to check your prostate and look for blockages of the tubes that carry semen (ejaculatory ducts and seminal vesicles).[13]

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. Some of the tests may need to be repeated.[13]

How might you feel?[13]

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 30 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[13]

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 you and your partner to reach an outcome. It can be a long, frustrating and emotional process and you and your partner should prepare yourselves for this (see page 30 for some suggested coping methods).

Hormonal therapy[13]

A 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. Ask your doctor for more information.

Surgery[13]

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. Ask your doctor for more information.

Varicocele repair[13]

A varicocele is a dilation (enlargement) of the veins of the scrotum. They are present in 15% of men. It is not known how a varicocele affects male fertility but the proposed explanation is that it could be due to increased temperature in the testicle or increased damage to sperm DNA. Varicocele repair is strictly indicated in cases of clinical varicocele (when it is detected on a physical examination), if there are abnormalities in the semen analysis, and where the condition is associated with pain and discomfort. There are several methods for repairing the varicocele. One method involves 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. 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.

Serious complications are rare after varicocele repair. Risks include injury to the testes, infection, bleeding, blood clot in the legs and risks from general anaesthesia. Varicocele can recur in up to 15% of men after the repair. Ask your doctor for more information.

Vasectomy reversal[13]

Vasectomy reversal, which repairs a surgically removed section of the vas deferens (sperm duct), is called a vasovasostomy. Microscopic surgery is needed and the procedure can take up to two hours to complete. 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.

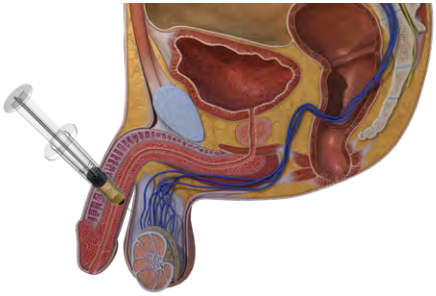
The results of a vasectomy reversal depend on how long ago the procedure was done. Ask your doctor for more information.

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[14]

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, its called azoospermia, and if there is a problem with sperm formation and production, its called non-obstructive azoospermia. For obstructive azoospermia, sperm can be surgically extracted from the epididymis or testicular tissue and be used to fertilise an egg by directly injecting the sperm into an egg in an IVF cycle. It is important to realise that any sperm which are obtained by this method can only be used in IVF and cannot be used for artificial insemination due to the small number of sperm retrieved.



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 tissue. Sperm are then carefully retrieved from the tissue. This is usually performed a number of times in different parts of the testes. 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).

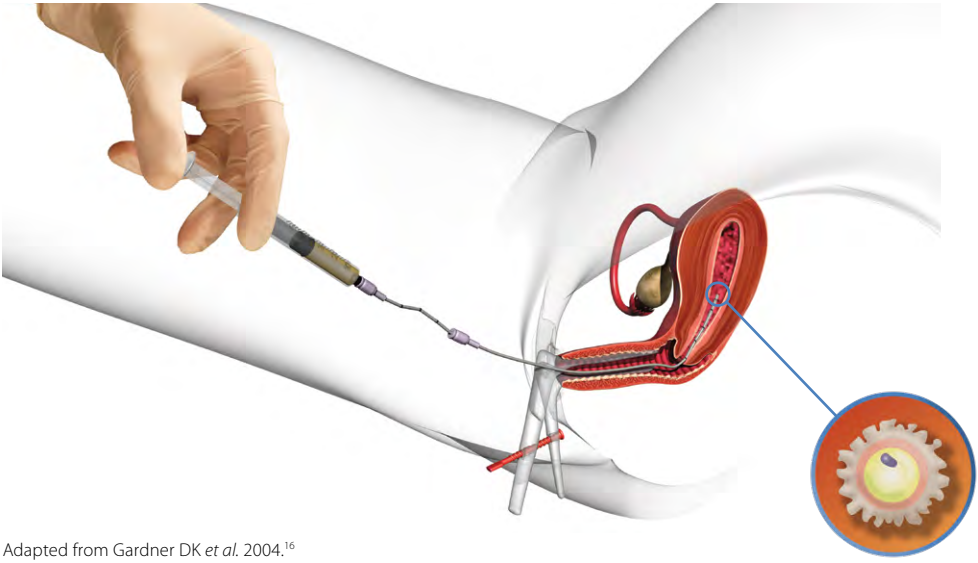
Microscopic testicular sperm extraction (MicroTESE): This is a microscopic surgical procedure to extract the sperm in cases of non-obstructive azoospermia. It is done under general anaesthetic and takes up to two hours to complete. A surgeon experienced in microscopic surgery will identify and collect testicular tissue that is most likely to contain sperm. Any sperm found in the tissue will be extracted and frozen, to be used fertilise the egg in the laboratory. The success rate of finding sperm in these cases is around 50%.

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.

With any of these extraction or stimulation techniques, there is a small possibility that no viable sperm will be found and in these cases, the alternative approach is to do fine needle testicular biopsy where viable sperm will be obtained.

Artificial insemination (AI) & intrauterine insemination (IUI)[15]

Artificial insemination (AI), is a procedure in which the semen is 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.



Adapted from Gardner DK *et al.* 2004.[16]

IUI is commonly used when there may be minor problems with semen, concentration or motility (movement), or in cases of sexual dysfunction where semen cannot be deposited naturally in the vagina (for example, in the case of impotence). The sperm are 'washed' – separated from the liquid part of the semen by centrifugation – and then inserted into the uterus to reduce the distance they have to travel to reach the egg.

FREEZING SPERM FOR LATER USE[17]

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.

Donor insemination[18]

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, if there is a high risk of passing on genetic diseases or in cases of female same-sex couples.

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.

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)** is a method of assisted reproduction that involves combining an egg with sperm in a laboratory dish. If the egg fertilises and begins cell division, the resulting embryo is transferred into the woman's uterus where it will hopefully implant in the uterine lining and further develop into a pregnancy.

IVF is a four-stage process.[8]

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 (Oocyte retrieval [OPU])

Once ovarian stimulation is complete, your doctor will try to retrieve as many eggs as possible. Egg retrieval is performed under light sedation. The mature eggs are identified, and under the guidance of vaginal ultrasound, a needle is passed through the vagina to withdraw eggs and the fluid that contains the eggs from the mature follicle with gentle suction. The fluid is immediately examined

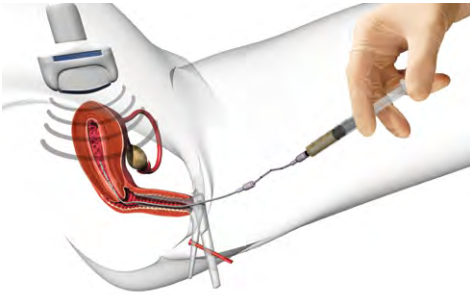
under a microscope to see if an egg has been retrieved. The process is repeated for each mature follicle in both ovaries. All retrieved eggs are removed from the follicular fluid and placed in an incubator.

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. There are two methods of fertilising the egg in the lab. The first is called standard IVF, where around 100,000 sperm are mixed with a single egg in a dish. The second method is called intra-cytoplasmic sperm injection (ICSI), where a normal looking motile sperm is injected directly into the egg. This method is used when there are problems with the sperm. 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 embryo is placed in a syringe and transferred to the uterus. With the advances that have happened in the field of IVF, a single embryo transfer is adopted as the safest approach to avoid the risk of multiple pregnancies. 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)[19]

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 60% of eggs fertilise normally regardless of the overall sperm quality.

Success rates

Success rates are influenced by a number of factors including (but not limited to):

- a woman's age
- cause of infertility
- response to medications and treatment
- sperm quality
- number of embryos transferred
- transfer and use of cryopreserved (frozen) embryos.

You should discuss success rates with your doctor.

Male infertility in summary[9–11,14]

Condition	Causes	Tests	Treatment
Sperm production problems, e.g. absent sperm, low sperm count, poor motility or abnormally shaped	• genetic changes • undescended testes • twisted testicle • physical injury to testes • varicocele (swollen varicose veins) • hormonal changes (see below) • testicular cancer • lifestyle factors, e.g. smoking, alcohol	• semen analysis • ultrasound, e.g. to detect testicular cancer or varicocele • testicular biopsy	• 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	• vasectomy/surgery • infection • genetic changes	• ultrasound • vasography	• 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	• side effects of prostate surgery • other diseases such as diabetes and multiple sclerosis • spinal cord injury • antibodies (produced by the immune system)	• semen analysis • ultrasound	• ART, e.g. surgical sperm extraction; IUI; IVF; ICSI
Hormonal problems	• low testosterone levels meaning sperm are not produced	• blood tests • semen analysis	• Hormonal medication, i.e. gonadotrophins
Unexplained infertility	• unknown		• 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 Access Australia, and the other organisations listed on page 31 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

Access Australia

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

Access Australia is a national patient advocacy 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.

Australian Donor Conception Network

www.australiandonorconceptionnetwork.org
Email: donorconceptionnetwork@gmail.com

The Australian Donor Conception Network is a self-funded 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 programs, adult donor offspring and donors. It offers a social events for members to share their experiences, Facebook groups to enable members to stay in touch, informative emails, a library of books and links to other helpful organisations.

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

www.endometriosisaustralia.org
Email: admin@endoaustralia.org

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

(Miscarriage, stillbirth and newborn death support)

www.sands.org.au
Ph: 1300 072 637;
Email: supportgroups@sands.org.au

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.

SUPPORT ORGANISATIONS

NEW ZEALAND

Fertility NZ

www.fertilitynz.org.nz
Ph: 0800 333 306;
Email: support@fertilitynz.org.nz

Fertility NZ 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.org.nz
Ph: +64 3 379 7959 (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: 027 44 91 019;

Email: info@sands.org.nz

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.

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Looking for more information?

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

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

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