

# Male Infertility

## Sperm production

Sperm are produced by repeated division of cells in small coiled tubules within the testes at a rate of approximately 100 million per day. Sperm production is a lengthy process; from the beginning of division of the stem cell to the appearance of mature sperm in the semen takes about 3 months. The sperm spend 2 to 10 days passing through the epididymis, during which time they mature and become capable of swimming and fertilising eggs.

The volume of liquid from the testes and epididymides is less than 5% of the total semen volume. About 65% of the semen volume comes from the seminal vesicles and 25% from the prostate gland. The average semen volume for healthy men ejaculating every two days is around 2 ml and the sperm concentration should be a minimum of 15 million per ml. During ejaculation the sperm and the prostatic fluid come out first and the seminal vesicle fluid follows. The seminal vesicle fluid coagulates giving the semen a lumpy gel-like appearance. After 10 minutes or so, liquefaction occurs and the gel disappears.

Under usual conditions with sexual intercourse during the fertile phase of the woman's menstrual cycle sperm quickly enter the cervical mucus and ascend the uterus and Fallopian tubes to the site of fertilisation in the outer third of the

tube. Sperm require motility (swimming ability) to get through cervical mucus and to penetrate the outer coverings of the egg.

The function of the testes is dependent upon hormones from the pituitary gland - follicle stimulating hormone (FSH) and luteinizing hormone (LH). The levels of these hormones rises during the early stages of puberty and stimulates testicular development. LH controls production of the male sex hormone testosterone which in turn is responsible for development of the genitals, beard and body hair, prostate and seminal vesicles, and also bone and muscle development and other aspects of the masculine physique. If LH and FSH are deficient the testes do not develop properly. In contrast, if the testes are damaged directly, the levels of these hormones in the blood rise. Thus the measurement of LH, FSH and testosterone in blood helps in the diagnosis of testicular disorders.

## Fertility tests

Usually clinical examination of the man and semen tests are all that is necessary. More than one semen test should be performed because the results may vary considerably from day to day. Tests may be needed to check for sperm antibodies and hormonal abnormalities. Exploratory operations and testicular biopsies are also performed occasionally to

check for blockages in the epididymis or vas deferens- the tubes of the genital tract connecting the testes to the penis. Blockages here would prevent sperm from being released normally.

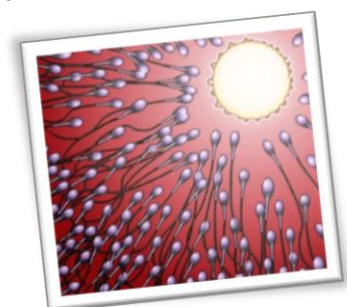
About 15-20% of couples do not achieve a pregnancy within 12 months of trying to have a child.

The male partner contributes to the infertility in about 45% of these couples (The female partner contributes in 45% of cases and about 10% are of an unknown cause).

Thus medical investigation of infertility should, from the outset, involve both the man and the woman.

## Types of male infertility

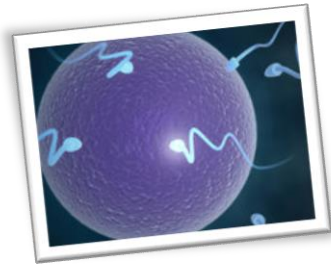
About 5% of infertile men are sterile, and the balance have disorders of sperm production or function. As long as sperm is recoverable from a man, generally he will be able to produce his own child.



### Male sterility

Sterile men have no sperm in their semen (azoospermia) because the tubules in the testes which produce sperm did not develop or have been irreversibly damaged. This may be associated with failure of the testes to descend into the scrotum during childhood, inflammation of the testes or treatment with certain drugs. In some men, sperm are produced in normal numbers, but they are either not motile (do not swim) or lack structures necessary for penetration and fertilisation of eggs which may be detected by microscope examination of the shape of the sperm and reported as abnormal morphology.

Some men with failure of sperm production do not produce normal amounts of the male sex hormone testosterone and their general health and sexual performance is improved by treatment with testosterone. It is possible for couples in this category to have a family using ICSI (with or without testicular/epididymal aspiration of sperm) or with the use of donor sperm or adoption.



### Treatable conditions Hormone Deficiencies

Deficiency of two hormones from the pituitary gland, LH and FSH, can be treated by injection or hormone preparations. Usually the testes increase in size and testosterone is produced in normal amounts and sperm appears in the semen after several months of treatment. At least 50% of the partners of such men conceive during treatment, but the treatment needs to be repeated for each pregnancy unless adequate sperm can be collected and stored frozen during the first course for later artificial insemination. This condition affects less than 1% of infertile men.

### Questions and Notes

### Sperm antibodies

Antibodies are normally produced in response to introduction of foreign material, such as bacteria, into the body and are protective.

However, antibodies to sperm develop in many men after vasectomy and may interfere with fertility after vasectomy reversal operations. Antibodies are also found in about 5% of other infertile men, some of whom have had injuries to the reproductive organs which may have caused immunization against sperm, but most have no obvious reasons why the sperm antibodies should appear.

The sperm antibodies are often present in the blood as well as in the semen and coating the sperm. The antibodies affect fertility at several levels - interfering with sperm output and reducing sperm numbers in the semen, causing clumping together of sperm and interfering with the sperm motility, preventing sperm from swimming through the liquid in the womb (cervical mucus) and interfering with sperm fertilising the egg. Men with sperm antibodies and sperm which will not penetrate normal fertile cervical mucus are severely infertile and pregnancies rarely occur without treatment.

### Obstructions

Approximately 5% of men have blockages in the epididymis because of failure of development, production of thick secretions in association with chronic lung disease (bronchiectasis) or following inflammation (especially gonorrhoea). Some patients can be treated by bypass surgery joining the tube in the epididymis above the block to the vas. Sperm appear in the semen of up to 50% of men after this surgery, but less (10 - 20%) produce pregnancies because the sperm are immature

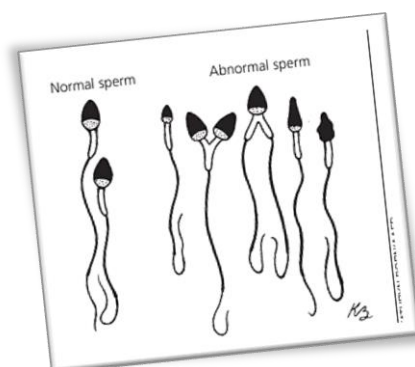
having bypassed the epididymis in which maturation usually occurs. In the future, it may be possible to treat the sperm in the laboratory to improve their fertilising ability.

### Disorders of sexual performance

In a small number of couples (less than 1%) the only reason for the infertility is failure of sexual intercourse because of no or inadequate penile erection (impotence), failure of ejaculation or retrograde ejaculation where the tube between the bladder and penis does not close during ejaculation so that semen passes into the bladder. Occasionally, these conditions respond to treatment. However, if adequate sperm can be obtained from these men, artificial insemination of the female partner is often successful in producing a pregnancy.

### Other Disorders of Sperm Production or Function

Over three quarters of men investigated for infertility have sperm present in the semen, but in lower numbers than normal - oligospermia (38%), or in adequate numbers but with reduced motility (33%). A few (5%) have normal semen tests.



### Reversible conditions

Some men in this group have a reason for the poor sperm test - incorrect sperm collection techniques such as too short an interval since previous ejaculation, recent illness, heavy alcohol consumption, obesity, frequent hot baths or saunas or treatment with certain drugs. Removing the cause results in an improvement within a few months.

### Associated conditions

Dilated veins in the scrotum (varicoceles) are present in many men (20-40%). Also common are previous testicular injuries, minor hormone disorders, surgery for torsion (twisting) or failure of descent of testes, inflammation of the genital tract (testes, epididymis, prostate), and sexually transmitted diseases. These conditions may cause or contribute to the poor semen quality, but it has not been shown that treatments improve the semen test results and increase fertility.

Tobacco smoking, moderate alcohol intake, diet, exercise, mental stress and anxiety, environmental toxins and exposure to heat as a result of tight underpants, are of uncertain relevance in causing abnormal sperm production or function. Changing lifestyle may be important for long-term good health, but there is usually no marked change in semen test results.

### Combination of male and female disorders

10% of couples have either unexplained infertility or both partners have some known cause. It cannot be over-emphasized that both partners of the infertile couple must be investigated in detail and abnormalities in the woman corrected where possible.

## Ineffectiveness of treatment

Many treatments have been tried in this group of men in the past including operations for varicoceles, antibiotic treatment for low-grade infections, drugs which alter hormone levels, artificial insemination with husband's semen, IVF and gamete intrafallopian transfer (GIFT). Also the possibility of fertilizing eggs by microinjecting a single sperm into the egg (ICSI) is a common form of treatment.

There are problems in assessing the success of treatment. First, semen test results are very variable from day to day within the one man so that an apparent increase in sperm number for example, from 3 to 20 million per ml, may result from a chance fluctuation that has nothing to do with the treatment the man happens to be taking at the time. Second, this group of patients are not sterile; pregnancies occur, but at a lower rate than normal, so that if a pregnancy occurs during treatment, it also may not necessarily be due to the treatment. To demonstrate that a treatment is effective under these circumstances it is necessary to show that semen tests improve more often and pregnancy rates are higher than with similar men given no treatment.

## Outlook for fertility

When couples in which the man has poor semen tests are followed over the years, a proportion conceive naturally, whether or not they have been treated. In the general community, pregnancy rates are about 30% per month, that is of women trying to conceive, about one in five is successful in the first month, one in three of the remainder successful in the second month, one in three of the

remainder successful in the third month, etc. However, the rate drops with time, so that approximately 40% of couples conceive within four to five months and 60% by one year.

In a large group of infertile men seen in Melbourne who had at least some motile sperm in their semen and whose wives were not sterile, the pregnancy rate was approximately 4% per month for the first few months. Overall, 30% of the female partners conceived in one year and 45% by two years.

Factors which were related to the pregnancy rates were as follows:

1. Sperm number; the more, the higher the pregnancy rate.
2. Length of time the couple had been trying to produce a pregnancy; the longer the period of infertility, the lower the pregnancy rate.
3. Age of wife; the older, the lower the pregnancy rate.
4. Previous pregnancy in the couple (same woman and man) compared with no previous pregnancies This was associated with a higher pregnancy rate.

By combining these factors future pregnancy rates can be predicted so that couples can be advised about their chances. This should allow them to make plans as to how long they would like to try themselves before changing to other alternatives such as artificial insemination with donor semen, IVF, GIFT or ICSI. IVF has a much better chance of conceiving than with normal intercourse and ICSI (Intracytoplasmic Sperm Injection) offers an even better chance with very poor quality sperm.

## Emotional reactions to infertility

Men have many different emotional reactions when their fertility is in doubt. Denial of the problem, anger with the partner and medical attendants, resentment about having to participate in fertility tests, feelings of depression, loss of self-esteem, marital disharmony, and temporary sexual problems, such as loss of interest and poor erections are common. These feelings are essentially normal and understandable initial psychological aspects of grief. These problems decrease with time as a realistic perspective of the significance of the infertility is achieved. Some couples may be helped to adjust by discussion with their doctor or Concept Fertility Centre's counsellor.



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