

What to do about infertility?

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Infertility happens when couples are unable to have a baby after 1 year of unprotected sex. About 15% of couples that try to get pregnant for the first time have a difficult time.

While a few couples may be completely unable to have children, others are considered sub-fertile, meaning that they may need some help to produce children.

About 30% of cases involve difficulty with a male partner alone, while another 20% involve both the male and female partners. So, a problem with a male partner can occur in up to 50% of cases.

Recent advances in our understanding of infertility and its treatments have improved the success rates for couples. In this chapter, we review the basics of normal reproduction, discuss the tests that are needed to help diagnose male infertility and go over the common causes and treatments for male infertility. Finally, we also review assisted reproductive technology methods, such as intrauterine insemination (IUI), in vitro fertilization (IVF) and intracytoplasmic sperm injection (ICSI).

How babies are made normally

For men and woman to have a baby, half of the genetic information of the man and half the genetic information of the woman must be brought together. The man has his genetic information in the sperm, while the woman has her genetic information in the egg.

Sperm are created in the testicles. It takes about 3 months to make sperm. To make sperm normally, the testicles receive hormone signals from a gland in the head called the pituitary gland. Two important hormones are released from the pituitary gland and flow to the testicle through the bloodstream. These are (1) follicle-stimulating hormone (FSH) which tells the testicles to make sperm and (2) luteinizing hormone [LH] which signals the testicle to make an important male hormone called testosterone. You need both of these hormones to work normally to make sperm.

From the testicles, the sperm travel through a series of tubes into a sac-like structure beside the testicle called the epididymis. As the sperm pass through the epididymis, the sperm undergo several changes in shape and composition and partially mature in these tubes. The sperm then travel through the vas deferens and into the prostate where the sperm is mixed with fluids from the seminal vesicles and prostate to form semen. During intercourse, muscles around the prostate contract and force the semen out the end of the penis. This fluid is ejaculated into the vagina near the cervix in the female. Sperm travel for up to 48 hours to get through the cervix and uterus and into the fallopian tubes – at this point, the sperm fertilizes the egg. Most often, women release one egg each month. Changes also occur in the uterus to allow the fertilized egg to implant.

Reasons why some men are infertile

1. Lifestyle

- Drinking too much alcohol reduces sperm quality and makes it more difficult to get pregnant.
- Using marijuana, cocaine and other drugs reduces sperm quality.
- Exposing yourself to too much heat in a sauna, steam bath or hot tub can cause a significant drop in sperm production.

2. Medications

- Some prescription drugs can affect sperm quality.
- Other prescription drugs may make it more difficult for the man to get an erection or to ejaculate into his partner.

3. Sexual function

- Using certain vaginal lubricants or failure to time intercourse when the sperm has a chance to fertilize the egg can reduce the chance of getting pregnant. For a sperm to fertilize the egg, many sperm need to be swimming. If there aren't enough sperm, it will be more difficult to get to the egg.

4. Hormone abnormalities

In general, there are 2 types of things going wrong with male hormones. (1) The pituitary may not produce enough hormones; and (2) The male may have too much hormone which means that the pituitary is working fine, but that the testicles can't respond to the hormone. Both of these cases can be a cause for male infertility.

Why is this important?

- Hormones are released from a central gland called the pituitary gland which direct the testicles to produce both sperm and the male hormone testosterone. In most cases, these pituitary hormones are normal indicating that the pituitary is functioning properly.
- Taking extra testosterone or other kinds of steroids for bodybuilding is very bad for sperm production. This can stop sperm production completely while on the testosterone and in some cases may be permanent. If you are trying to establish a pregnancy, you should stop taking testosterone.

5. Varicoceles

About 40% of men who have problems have enlarged veins above the testicle, which are called varicoceles. These veins normally drain blood back to the heart from the testicles. In some men, the blood does not flow properly through these veins and the blood can pool around the testicles leading to poor sperm production and quality.

6. Past surgeries

Past surgeries, including surgery for undescended testicles or hernia, may damage sperm production or block the flow of sperm.

7. Diabetes

Diabetes can also be a risk factor for male infertility in that it can cause problems with erections or ejaculation.

8. Blockage of sperm

In some cases, sperm is being produced normally, but because of the blockage in the system, the sperm cannot get to the testicle. In some cases this may be due to infection in the testicle. Other causes may include a hernia repair, which can block the vas deferens. Some men are actually missing the vas deferens, which flow from the epididymis to the prostate so that no sperm can get to the prostate. In these cases, getting sperm out of the epididymis or testicle can be used with advanced reproductive technologies such as ICSI [we'll go over this later).

Testing male infertility

Since it is common for difficulties with fertility to exist in both the male and female partners, specialists should evaluate both partners at the same time. Patients who have sperm quality abnormalities should be thoroughly investigated by a specialist trained in male fertility.

The male partner will need a complete history and physical exam. He will also be asked about possible work or home exposure to toxins, heat or radiation. Lifestyle risk factors include smoking or excessive alcohol intake and use of illicit drugs. It's important to find out about any illnesses or surgeries that could contribute to reducing sperm production or blocking the flow of sperm from the testicles out to the prostate.

In the physical exam, your doctor will look for signs that a man's hormones are functioning normally. Signs of abnormal hormone production include reduced body hair, smaller testicles or penis and reduced muscle development. Male breast development (or gynecomastia) can sometimes be present. Examining the testis is extremely important. The testicle should be a normal size and the tubes connecting the testicle to the prostate called the vas deferens must be present on both sides. To check for enlarged veins (or varicoceles), the man must be standing. These veins can be felt when the patient takes a deep breath and bares down to increase pressure in the veins. Lastly, the penis should be examined to look for problems with the opening of the penis (meatus), penile curves or a tight foreskin.

Testing the semen

A basic evaluation for fertility should have at least 2 semen tests. If the two tests show very different results, you will need another test.

A semen specimen can be obtained by masturbation; the specimen should be delivered to the lab where the test will be done within 30 to 45 minutes. Before the test, the man should not ejaculate for at least 48 hours but no more than 5-7 days. When you give your specimen, you should not be sick (have the flu or a cold) because this will reduce your sperm count.

Other important tests

Most men who have abnormalities in their semen analysis should have hormone testing done to include follicle-stimulating hormone (FSH) and testosterone. Often, other tests such as luteinizing hormone (LH) estrogen, thyroid function tests and serum ferritin levels may also be checked.

If the testicles are difficult to examine or if any abnormal structures are felt in the scrotum, you may need an ultrasound of the testicles to check for enlarged veins. However, this type of test cannot replace a good physical exam. If a blockage in the prostate is suspected, you will need an ultrasound of the prostate via the rectum.

What we find in the semen analysis

- The volume of fluid (at least 1.5-2 mL)
- The concentration of sperm – should be at least 20 million sperm per mL
- The percentage of sperm swimming (or motility) – should be at least 50%
- The number of normally shaped sperm (or morphology) – at least 4% of sperm should be normally shaped
- There should be less than 1 million white blood cells per mL ejaculate (otherwise you may have an infection).

In some cases, you may need a specialized sperm test. This may include measuring antibodies; your body may be creating these against your own sperm and the presence of infections. In certain cases, DNA testing of the sperm may determine the ability of a sperm to fertilize an egg.

Biopsy of the testicle

If your doctor suspects your sperm are blocked from coming out, you may need a biopsy of the testicle may to confirm that your sperm is normal. This small procedure is most usually done with local anesthetic and you will only need about 2-4 days to recover.

How do you fix male infertility?

There are steps you can take to increase your fertility chances. Any of these lifestyle changes will take about 3 months to show up as improved sperm quality in the semen. With the simple steps, you may be able to establish a pregnancy.

1. Maintain a healthy lifestyle with regular exercise and good food intake.
2. Avoid smoking cigarettes or other tobacco products, using any street drugs or drinking too much alcohol.
3. Avoid anything that the temperature around the testicles (hot baths, hot tubs or steam baths).
4. Review any medications you are taking with your doctor. They may affect your ability to have intercourse or reduce sperm production. Your doctor may tell you to stop taking these or switch them. Don't change without advice from your doctor!
5. Stop taking testosterone.
6. See a specialized endocrinologist if your problem is hormonal. Sometimes, hormone problems can be the cause of reduced sperm production. Hormone replacement can be given by injection or pills. Sometimes, having too much iron or other hormone problems (diabetes or a reduced thyroid activity) can reduce sperm production.
7. Stop using lubricants like Vaseline or other lubricants – these kill sperm. Instead, use a small amount of natural oils, such as mineral oil, as a safe lubricant.
8. Have regular intercourse during the time that your female partner is producing her egg to make sure that your sperm is present when the egg is prepared to be fertilized. To increase your chances of having a baby, you should be having intercourse every second day during the time when the female partner is producing her egg.

Other ways your doctor can help

1. See your doctor about treating your varicoceles (large veins causing abnormal blood flow above the testicle). This can be associated to abnormal sperm production in some men. These veins must be blocked off from the testicles to be treated. This can be done with a surgical approach or with a nonsurgical approach.
 - Microsurgery is done through a very small 3 cm incision at the top of the groin. The veins from the testicles that are enlarged are then carefully clipped or tied. This is most often completed under general anesthetic and you will need to be off work for about 4-7 days. This procedure is successful 95% of the time. There is a very small risk (less than 1%) of the main artery of the testicle being damaged, which can lead to shrinkage of the size of that the testicle.
 - Laparoscopy is another option which also requires a general anesthetic and the about the same amount of time off work. It is unclear if this procedure is as successful as open surgery.

- A nonsurgical approach involves placing a small intravenous needle through one of the larger veins in the neck or groin and then passing a small tube through the venous system to block off the veins from the inside. This is usually done with sedation and you recover within 2-3 days. This procedure is successful about 80% of the time.
 - So long as the veins are blocked off, about 70% of men will improve their semen analysis results within 3-12 months and the chances of pregnancy are increased in most couples.
 - The type of repair doesn't matter so long as the veins are successfully blocked.
2. Visit your doctor to check if the flow of sperm from testicles to the prostate is blocked. This can be caused by previous infection or injury, operations including vasectomy, during hernia repair, or other types of testicle surgery. If sperm are blocked and unable to travel from the testicle, you may need surgery to restore the flow of sperm.
 - In the case of previous vasectomy, vasectomy reversal is a cost effective and highly successful treatment for blockage. Microsurgery is used to repair the previous vasectomy site to restore the flow of sperm.
 - In other cases, a bypass operation can be done, connecting the vas deferens to the epididymis directly.
 - These operations are most often done with a general anesthetic and often require up to 7 days off from work.
 - These operations are technically demanding and are best performed by specialist with training in male fertility surgery.
 3. Get specialized genetic testing if you are missing the tubes needed to bring the sperm to the prostate from the testicles (vas deferens).
 4. Undergo a small operation if you have blockage in the prostate, the amount of semen fluid will be significantly low. In cases when the blockage is in the prostate, a very small operation might be needed to remove the blockage.
 5. Consider assisted reproduction. If the blockages are too difficult to repair or cannot be repaired due to the length of the blockage, then sperm are taken directly from the epididymis or testicle for use in assisted reproduction. Sperm can be retrieved from the epididymis under local anesthetic with an aspiration procedure called percutaneous epididymal sperm aspiration (PESA). In this procedure, the testicle is frozen with anesthetic and a very fine needle is inserted directly into the epididymis and sperm is retrieved. This is simple procedure, which takes little time and usually almost no time to recover. This type of procedure can also be done under general anesthetic with microscopic epididymal sperm aspiration (MESA) although this is used infrequently.
 - The sperm that are retrieved can be used for assisted reproduction with IVF or ICSI.
 - If sperm cannot be retrieved from the epididymis, retrieval from the testicle is another method to get sperm for assisted reproduction. This can be done with either a very small procedure under local anesthetic called testicular sperm extraction (TESE) where a small opening is made in the skin and cover layer of the testicle or with an aspiration procedure (TESA) also done under local anesthetic.

- The success of assisted reproduction does not appear to be affected by the type of retrieval.

Assisted reproduction

Up to 30% of men with abnormal sperm quality will have no obvious cause for the poor sperm quality. Unfortunately, there are no good treatments to improve the quality of the semen in these cases. In other cases, even when known causes are fixed, the sperm quality may still not be good enough to allow pregnancy to take place.

However, there are many men with abnormal sperm quality that can have children. It is important that both the male and female partners are investigated. In many cases, both partners can have challenges to their fertility. In situations where both partners have been completely investigated and treated and pregnancy is still not occurring, the couple may have to undergo procedures which can increase a woman's egg production or increase the chance of sperm fertilizing the egg by bringing sperm and egg together outside the body.

Fertility drugs

In some cases, women can be treated with fertility drugs to stimulate the ovary to produce more eggs. This is carefully monitored with blood tests and ultrasounds and can be used to help with timing of intercourse to optimize the chance of establishing a pregnancy.

Sperm injections

In other cases, sperm can be injected directly inside the female partner when she is producing her egg. Sperm is often "washed" in a specialized lab and then the most active sperm are used to inject into the female partner. The goal is to deliver a large number of sperm directly towards the egg on the day when the woman's egg is most able to accept sperm. Usually 1 or 2 of these procedures are done per cycle.

The chances of achieving a pregnancy depend on the quality of the sperm and the age of the female patient. Usually there needs to be at least a 5 million sperm per millilitre of semen for this to work. Up to 15% of couples will be able to achieve pregnancy using this method. However, doing more than 3-6 of these injections is not beneficial. In this case, the couple should proceed to in vitro fertilization.

IVF

IVF involves mixing sperm from a male partner with eggs, which are retrieved from the female partner using ultrasound after the ovaries have been stimulated to produce more than one egg to create embryos. Once the eggs are fertilized, 1-2 embryos are transferred into the woman's uterus 2-5 days later.

If there are not enough sperm present to mix sperm and egg together, a very specialized procedure involving injection of a single sperm directly into the eggs from the female partner can be successful. This procedure is called ICSI and is used for couples when the man has a very low sperm count, if previous attempts at assisted reproduction of failed, if sperm needs to be taken from the male partner or if repair of blockages have failed. This procedure involves several steps:

1. Eggs are removed from the female partner with an ultrasound.
2. Sperm are selected for the most motile and best shaped sperm.
3. This sperm is then picked up into a small tube.
4. Sperm is injected directly into the egg.
5. After 2-5 days, the embryos are transferred to the female partner.

Summary

We've come a long way in fertility! It's important for males to have a complete evaluation by a specialist trained in male fertility to identify and correct any risk factors to sperm production and improve the chances of pregnancy.