

SUPPORTING PATIENTS WITH CANCER:

FREQUENTLY ASKED QUESTIONS



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Commonly asked questions about cancer, treatment and male fertility

What is fertility?

Fertility is a person's natural ability to have children. Fertility starts at puberty, although the cells that will become eggs and sperm are present in the ovaries and testes from before birth^{1,2}.

In men, sperm are produced from cells located in the testes². The testes continually produce millions of sperm every day throughout the man's adult life.

Essentials for conception: what do you need to get pregnant?

To achieve a pregnancy, there needs to be a supply of eggs (oocytes), a functioning womb (uterus), viable sperm, and, if conception is to occur naturally, the desire and ability to have sexual intercourse with a partner. You can also use assisted reproductive techniques such as in vitro fertilisation (IVF) and/or intracytoplasmic sperm injection (ICSI).

IVF

– a technique where an egg and a sperm sample containing many sperm are placed in a test-tube or petri dish to allow fertilisation

IVF-ICSI

– a technique where an egg is fertilised by a single sperm using a sperm injection technique

What types of treatments are used to treat leukaemia and how do they affect fertility?

Treatments used for cancers of the blood (white blood cells; ALL, AML, and CML) include³⁻⁵:

- Chemotherapy
- Radiotherapy
- Targeted therapy – where drugs target specific genes and proteins that are involved in the growth and survival of cancer cells
- Antibody therapy (also known as immunotherapy) – where the antibody binds to a specific site on a cancer cell to activate the immune system. This destroys the cancer cell or blocks the development of tumour blood vessels

Cancers of the white blood cells have a tendency to spread to the ovaries and testes (the primary reproductive organs in the body – the testes in men and the ovaries in women), so therapy needs to be specifically directed to these areas. The risk of therapy-induced fertility problems varies with time and intensity of treatment.

How can leukaemia treatment affect fertility?

The risks of infertility depend on the treatment regimens used¹, and whether they are used in combination with other treatments. It is important to speak to your doctor about this as it can be different for every patient.

Chemotherapy targets rapidly dividing cells – this includes cells in the testes and ovaries¹, hair follicles,

and the cells that line the intestines. This is why chemotherapy causes nausea and hair loss and is the reason that fertility is also affected.

Radiotherapy damages the DNA of cancer cells. The radiation also affects the DNA of the surrounding healthy cells, which may include the ovaries and testes². Your doctor will try to minimise this using shields to protect specific areas and keeping radiation 'scatter' to a minimum.

There is currently little information on the effects of targeted therapy and immunotherapy on fertility². It is suspected that these treatments are less damaging than chemotherapy and radiotherapy, but more studies are needed.

How treatment affects sexuality

It is important to note that treatment side effects may affect physical and emotional sexuality:

Physical side effects

Makes the skin more sensitive

Fatigue

Pain

Erectile dysfunction or premature ejaculation

Emotional side effects

Treatment worries

Illness worries

Survival worries

Anger

Chemotherapy effects

Sperm production is very sensitive to some chemotherapy drugs⁷. Many men will have a very low sperm count after treatment⁸, but depending on the treatment received, this will then recover. However, in some men, their sperm production and fertility will be permanently reduced.

Sperm counts may not decline for a month or two after starting treatment since mature sperm cells are not dividing and are less sensitive to chemotherapy.

Radiotherapy effects

Radiotherapy has a detrimental effect on the development of sperm by directly causing DNA damage to both the sperm 'stem cells' and immature sperm⁷. The amount of damage done to the immature sperm depends on the dose, with higher doses causing greater and potentially more permanent damage⁹.

Depending on the field of radiation needed, it may be possible to use protective shielding placed over the testes during treatment, to reduce the dose of radiotherapy that the testes receive

Can I get help to deal with the process?

Your oncology team will be able to refer you to a fertility centre if you are considering a fertility preservation procedure before you start treatment, or to discuss it further.

Following completion of treatment, you should also discuss any fertility concerns with your care team, who will be able to refer you to a fertility centre.

What should I do about contraception?

Contraception during and after treatment

Barrier contraception is recommended during and after treatment. It is important that you do not pass chemotherapy drugs to your partner during sex without a condom¹⁰. Sperm DNA damage may occur during treatment and for 6 months after treatment has finished⁸. This could result in an increased risk of miscarriage if pregnancy occurs soon after treatment is completed¹¹.

What is fertility preservation?

Fertility preservation is a series of techniques and steps taken to collect and store reproductive tissue and/or cells to help you have a biological family in the future, after a disease-free interval.

Fertility preservation procedures are normally performed prior to treatment, and it is important to discuss whether this is relevant and possible for you with the oncology team regarding the risk to your fertility of the planned treatment, and any potential delay to treatment due to the fertility preservation process.

What approaches are there for fertility preservation?

Sperm banking

The established technique for male fertility preservation is sperm cryopreservation⁹. It is important that samples are collected prior to treatment starting⁹.

A semen sample obtained by ejaculation is the conventional, simplest, and least invasive method of collection¹². Samples obtained are split into a number of containers before freezing to allow several treatment cycles later on¹².

- Samples may be collected in the clinic or at home in special sample cups tested by the lab¹³
- Lubricant use should be minimal due to the possibility of adversely affecting the sample¹³
- It is important to collect the entire sample as more sperm are present in the first part of the ejaculate¹³

Before sperm collection, men should:

- Avoid wet heat (e.g., hot tubs and saunas)
- Ideally maintain abstinence for a 2–4 days

Ejaculation may prove difficult for some patients based on the stage of cancer, limited mobility or

sometimes erectile dysfunction may make semen collection difficult^{6,12}. If this is the case, there should be a discussion with the fertility team regarding treatment to help with these problems¹².

How much sperm is needed?

If you have a good sperm count on testing, the clinic may just ask you to produce one sample. However, often men will have low or poor sperm count at the time of diagnosis¹⁴, so this may require repeated sample collections, if there is time.

What if I can't produce a sample easily?

If a semen sample cannot be obtained via masturbation, there are other options for sperm collection, such as⁹:

- Electroejaculation
- Open testis biopsy
- Microscopic epididymal sperm aspiration

These treatments are not commonly available and may have extra risks where there is a bleeding problem (a possibility with patients with ALL, AML, and CML). Some of these procedures require a general or local anaesthesia and their use may be determined by patient health¹².

Tissue banking

Testicular tissue-banking is at an experimental stage of development and there are no clinically available restoration methods available⁷. There is also a risk from bleeding problems, or if there are leukaemia cells within the testis.



Cryopreservation method		
	Slow freezing	Fast freezing
Alternative names	Controlled rate Slow programmable	Vitrification
Time frame for sample being cooled to -196°C	Several hours ¹⁵	Few minutes ¹⁵
Used for preserving	Sperm ¹⁷	Eggs ¹⁸
Why is this process used?	Allows the storage of large sample volumes ¹⁷	Prevents the formation of ice crystals in the egg ¹⁵

Cryopreservation techniques

There are two methods of cryopreservation for eggs and sperm – vitrification or slow freezing¹⁵. In both cases, the sample provided is cooled to -196°C¹⁶, which places the eggs and sperm into suspended animation until thawing and fertilisation can take place.

Routine testing of samples

In the UK, and in many other countries, a blood sample will be routinely tested for blood-borne viruses (such as HIV and hepatitis C)¹⁶. This is to ensure safety and prevent contamination of the samples during storage¹⁶ and has no influence on whether samples are frozen and retained.

Written consent for preservation is required

Written informed consent will be required for storage, and you will need to specify how long you want the sample to be stored (in the UK, cancer patients may store their samples for up to 55 years¹⁶). The consent forms will also include information on what you wish to be done with the sample should anything happen

to you¹⁹, and whether the sample is to be used for your own treatment or may be donated to someone else or used for research¹⁹.

Consent can be withdrawn or updated at any point during this process, and you must keep the clinic informed of an up-to-date address to maintain correspondence.

How successful is pregnancy after cryopreservation?

Your sperm count may be low for a period of time after treatment, but in some men, it recovers to normal, and they are able to have children naturally¹⁴.

If your sperm count stays low, it may still be possible to use your sperm for assisted reproduction (ICSI, a form of IVF). If you are not producing any sperm after treatment, you may be able to use sperm you stored before treatment. Cryopreserved sperm are not affected by length of storage²¹.





For those patients using banked sperm and IVF techniques, studies following up couples who used sperm after cryopreservation found no increased rates of stillbirths or malformations in babies born using frozen-thawed sperm²².

How soon can I try to conceive after treatment?

It is recommended not to try to conceive soon after treatment, as those sperm that are already being made may have been damaged by the treatment you have had²³. There is no universal time span about how soon after the end of treatment that there should be an attempt to conceive as this is very individual and dependent on your treatment. Sometimes your doctor will advise waiting longer, perhaps even up to 2 years, to ensure that you have fully recovered from your treatment. Additionally, the risk of the cancer returning is highest in the first 2 years after treatment¹⁰.

It is often recommended to have a repeat semen analysis 1- and 2- years after the end of treatment, although many men have sperm return to the ejaculate much sooner²⁴. Discuss the importance

of follow-up with the care team after treatment finishes, as men often don't follow-up after the end of treatment.

How am I feeling?

A cancer diagnosis is a difficult and challenging time¹⁹. You will have to process a lot of complex information about cancer treatment and fertility options in a short period of time²⁵. Being told that your cancer treatment may impact on your fertility may be overwhelming and can be stressful and upsetting²⁶⁻²⁸. Speaking with your care team and being involved in the discussion about any fertility preservation options may alleviate some of these feelings and help you to cope with your decisions^{29,30}.

If you are currently in a relationship, it is advised to involve your partner in fertility discussions³¹. If you are not in a relationship at the moment, please ask your care team for support in developing strategies for communication with future partners. If you feel overwhelmed with any decisions, please speak to your care team who may not realise you need help in coming to a decision²⁸.

Support services examples

Fertility Network UK	www.infertilitynetworkuk.com
British Infertility Counselling Association	www.bica.net
Human Fertilisation & Embryology Authority	www.hfea.gov.uk
British Fertility Society	www.britishfertilitysociety.org.uk
Leukaemia Care Organisation	www.leukaemiacare.org.uk
Leukaemia Care Organisation “know your rights” toolkits	https://www.leukaemiacare.org.uk/support-and-information/campaigning-and-advocacy/know-your-rights-toolkit/
Macmillan Cancer Care	www.macmillan.org.uk
Cancer Research UK	www.cancerresearchuk.org
Teenage Cancer trust	www.teenagecancertrust.org



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