



Hormone treatment (masculine)

Adult Gender Identity Clinic (GIC), Tavistock and Portman NHS Foundation Trust

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Introduction

You have requested masculinising hormone treatment, in order to help treat your gender dysphoria/incongruence and to make your body more congruent with your gender identity. We will be recommending that your GP prescribe you the male hormone testosterone. Testosterone will result in your body developing a more male physical appearance. It will also automatically decrease your body's production of the female hormone oestrogen, which will decrease your female physical appearance.

Although hormone treatment is very effective and causes noticeable changes, you may also wish to undergo other procedures to further masculinise some aspects of your body, such as mastectomy (removal of the breasts) and genital reconstruction surgery.

Hormone treatment is generally very safe, but there are some side effects that you should be aware of and that will be explained to you at the time of prescribing. However, the good news is that transgender men and transmasculine people treated with testosterone have the same life expectancy as the general population, telling us that this is a very safe treatment even if it is taken over many years.

Some of the changes in the body produced by testosterone are reversible if you stop treatment but many are permanent, including your voice breaking, hair loss from your head and increased facial hair. It is therefore important to be sure that hormone treatment is the right option for you before it is started.

If you ultimately decide to have your ovaries removed (which can happen both as a part of genital reconstruction surgery or separately from it) then this would mean that, even if you stopped testosterone, your body would produce very little oestrogen. Therefore testosterone treatment would need to be continued to prevent the complications of having no sex hormone production, such as osteoporosis (brittle bones) or early heart disease.

How Hormone Treatment Fits with other Aspects of your Transition

At the Tavistock and Portman NHS Foundation Trust Gender Identity Clinic (GIC), previously known as the Charing Cross clinic, you will be assessed by 1 or 2 clinicians, and sometimes more, before hormone treatment is recommended. This is in order to make sure that hormone treatment is the best way to manage your gender incongruence.

Our approach and guidelines are consistent with the World Professional Association of Transgender Health (WPATH) Standards of Care 8 guidance (Coleman et al., 2022). We follow an internationally agreed approach known as Triadic Therapy, which consists of three successive stages; firstly, social gender role change (living in a male or transmasculine role, and formerly called the Real Life Experience); secondly, hormone treatment; and finally, gender related surgery.

This means that we normally ask you to demonstrate progress with changing social gender role before hormone treatment is started; indeed, studies have shown that it is social gender role change, and not hormone treatment, that has the biggest effect on reducing psychological distress and making a person feel better about themselves. Once hormone treatment is started, we then normally want you to become established on this before any surgical interventions. We follow these three stages because as you progress through them there are progressively more significant and irreversible physical changes, which may make it harder to revert to your gender assigned at birth.

It is also important to say that not everybody wants or needs to go through all three stages. Some people change social gender role without having hormone treatment, and some people who have hormone treatment choose not to have any gender related surgery. A minority of people will also have gender related surgery without hormone treatment.

Our Standard Hormone Regimen

Masculinisation is achieved by the administration of testosterone. This is most commonly given in the form of Sustanon® injections, which contain testosterone, usually at a dose of 250mg every 2-4 weeks. Testosterone Enantate injections can be seen as equivalent to Sustanon. If someone has a peanut or other nut allergy Sustanon will not be recommended.

Once the injection is given the testosterone level in your blood will rise for about one week, and then gradually fall until the next injection. The aim of treatment is to achieve peak testosterone levels in the high normal male range but less than 30nmol/L one week after the injection, when the testosterone level is at its highest, and to achieve trough testosterone levels in the low normal male range (8-12nmol/L) on the day of and just before the next injection, when the testosterone level is at its lowest. A blood test can be taken at each of these times (i.e. one just before the injection and one a week afterwards) to measure what are called the 'trough' and 'peak' testosterone levels. The first blood tests are normally taken at the time of the 4th injection.

If the trough testosterone level is too high or low then the length of time between Sustanon injections can be increased (if the trough testosterone level is too high) or decreased (if the trough testosterone level is too low). If the peak testosterone level is too high or low then the dose of Sustanon can be decreased (if the peak testosterone level is too high) or increased (if the peak testosterone level is too low).

Although Sustanon or Testosterone Enantate injections are commonly used, testosterone can also be given in other ways. These include daily testosterone gels, and a long-acting injection called Nebido® which is given about every twelve weeks (after an initial loading phase). We never initiate treatment with Nebido but can sometimes switch you to this once you are well established on another form of testosterone. We do not use testosterone tablets anymore, as these can affect the liver. Testosterone gels may be recommended in the first instance if your BMI is 40 kg/m² or more, if you smoke/use tobacco or if you have a history of cardiovascular disease or other risk factors for cardiovascular disease. Additionally, if you have issues around mood stability or impulsivity then testosterone gel tends to provide more stable testosterone levels day-to-day as compared to injections and this can be better for people where there are such concerns.

With testosterone gels we do not measure peak and trough testosterone levels. Instead, a blood test is taken at a specified time after the testosterone is applied (4-6 hours after), and the aim is to get the plasma testosterone level into the middle normal male range (15-20 nmol/L). On the day you do your blood tests it is important to put the gel on your legs or body NOT on your arms. Generally, gel is best applied to alternate thighs (if not too hairy) and care taken to avoid transferring gel to anyone else. Wash hands carefully after application.

With Nebido, we measure trough testosterone levels (taken the same day but before a Nebido injection is administered) with the aim to have the testosterone level in the lower third of the normal adult male range (typically 10-15 nmol/L). If the trough testosterone level is too high or too low, we usually adjust the length of time between Nebido injections up or down by a week.

If testosterone is given at a high enough dose then this will normally stop the ovaries from producing oestrogen, and menstruation will stop fairly quickly. In the rare cases in which this does not happen, menstruation may be suppressed by using a progestin such as medroxyprogesterone acetate tablets, or a GnRH analogue injection. If the ovaries and/or uterus are removed surgically these medications can be stopped.

Individualised regimens for non-binary people

Masculinisation / androgynisation is achieved by the administration of testosterone. For non-binary (NB) people assigned female at birth (AFAB), this is most commonly given in the form of testosterone gel, at a dose titrated to the individual's desired level of physical change.

If full masculinisation is desired, then injectable forms of testosterone can also be considered after you are established on a testosterone gel.

Approach for non-binary people: low-dose and full-dose hormone treatment options

Often for people with a non-binary or fluid gender identity that were assigned female at birth, testosterone is used to treat dysphoria and cause physical change to make their bodies more congruent with their gender identity. Depending on the level of masculinisation or androgyny desired, different levels of testosterone, or different formulations, may be recommended. It is important to note that there are approximate threshold values of testosterone for different physical features. Therefore, achieving the preferred level or mix of masculine, feminine and/or androgynous features may be difficult to achieve or may not be possible. It is also important to note that some changes are permanent. Therefore, even though stopping or reducing the dose of testosterone will likely cause some reversion of masculinisation, facial hair, clitoral growth, voice deepening and scalp hair loss/thinning are quite unlikely to regress fully or at all.

We often use low-dose testosterone gel therapy to start with, but over time and depending on your goals full-dose testosterone therapy can be considered, either as testosterone gel or testosterone injections. Both approaches are discussed below.

Testosterone will also automatically decrease your body's production of the female hormone oestrogen, which will typically decrease your feminine physical appearance. In some cases for NB AFAB people neutrality is desired and sometimes a hormone blocking injection (a GnRH analogue) is used to block the production of oestrogen, as well as suppress menstruation.

Low-dose, potentially long-term

Usually low-dose is started with 1 or 2 pumps of a testosterone gel (about 10-20 mg of transdermal testosterone, whereas the standard full-dose starting dose is about 40 mg) to allow a gradual pace of change. Adjustments to therapy are guided in part by blood tests (to check safety) but also by your goals and progress on treatment, including how you are feeling about the changes you are experiencing on the current dose and whether you feel you want to increase or decrease the dose.

This low-dose approach may be useful if you desire:

- Genital growth
- Mild increase in body hair
- Deepening of the voice
- Partial masculinisation of the body

There are *approximate threshold levels of testosterone* for different physical features:

- Genital enlargement: *LOW* levels - and quite early
- Voice breaking: *LOW* levels - but can take several months
- Facial hair development: *MEDIUM* levels
- Increased musculature: *HIGHER* levels

Advantage of low-dose long-term:

- Steady hormone levels may allow a more predictable effect on mood and emotional state.

Disadvantages:

- There are threshold values of testosterone for different physical features and we cannot change that order. Therefore, getting the preferred mix of feminine and masculine features may be difficult to achieve or may not be possible. For example: it is not possible to have increased musculature and a more masculine body shape without some degree of genital growth, voice deepening and facial and body hair growth.

Full-dose, potentially short-term

Usually full-dose is started with 2 pumps of a testosterone gel (about 40mg transdermal testosterone) but short-acting testosterone injections (Sustanon or Testosterone Enantate) may also be considered. Adjustments to therapy are guided in part by blood tests (to check safety) but also by your goals and progress on treatment, including how you are feeling about the changes you are experiencing on the current dose and whether you feel you want to increase or decrease the dose.

As a general guide, the sequence and timing for masculinising changes to occur on full-dose testosterone treatment are as follows:

Effect	Onset (months)	Maximum (years)
Skin oiliness / acne (acne often settles in time)	1-6	1-2
Periods stop	2-6	-
Increased energy, drive, libido	3-6	1-2
Clitoris enlarges (often to about 4-5cm)	3-6	1-2
Vaginal atrophy (possibly drier / tighter)	3-6	1-2
Fat redistribution (more masculine body shape)	1-6	2-5
Deepening of voice	3-12	1-2
Increased muscle mass / strength	6-12	2-5
Facial and body hair growth	6-12	4-5
Scalp hair thinning and/or loss (VARIABLES)	6-12	

For further information, you may wish to check page S254 of the WPATH SOC 8 guidance (Coleman et al., 2022), available at:

<https://www.tandfonline.com/doi/epdf/10.1080/26895269.2022.2100644?needAccess=true>

Advantages of full-dose, short duration approach:

For example, full-dose testosterone treatment for a short-period of time (i.e., up to 6 months) may be useful if genital growth and voice deepening are desired, but you want minimal change to facial, body and scalp hair.

Risks of full-dose, short duration approach:

- Fluctuating hormone levels may flare body dysphoria
- There may be periods of time when not in a steady state hormonally, which may lead to fluctuations in emotions

Whether to continue, reduce or stop testosterone therapy

Usually when a non-binary person has achieved their desired level of change on testosterone therapy we ask them to consider whether they wish to continue treatment, stop treatment or reduce the dose of testosterone.

If stopping or reducing the testosterone therapy the following changes typically do not revert fully or at all:

- **Clitoral development** is not likely to regress
- **Voice changes** are unlikely to reverse fully
- **Facial hair** will either not regress, or only regress slowly
- **Scalp hair thinning/loss**, unlikely to regress fully

If stopping or reducing the testosterone therapy the following tend to revert:

- **Body hair** patterns may gradually regress to female pattern.
- If facial hair development has occurred and is unwanted, this may need laser and electrolysis
- **Body fat** distribution and **muscular strength** would be expected to regress to a female pattern
- If **periods** have stopped, then they are likely to return

On the other hand, ongoing testosterone use will maintain the masculinisation that has already occurred and may cause further masculinisation (although further masculinising changes are usually minimal after 5 years).

Effects of Hormone Treatment

Once testosterone treatment starts you are likely to notice some masculinisation of your appearance quite quickly, but the full process of masculinisation takes between 2-5 years.

Stopping of Periods

We would expect menstruation to be suppressed for most people when serum testosterone levels are in target range for whichever testosterone formulation you are on. If not, we may be able to suggest an additional medication, such as medroxyprogesterone acetate tablets, or a GnRH analogue injection. If the ovaries and/or uterus are removed surgically these medications can be stopped.

Facial and Body Hair

Testosterone treatment causes facial hair growth in the beard and moustache area. It also causes body hair growth in the chest, abdomen, lower back and inner thighs, with the pubic hair reshaping to a male pattern. If male pattern baldness runs in your family then over time you may also experience this. Scalp hair thinning/loss is an ongoing risk of testosterone therapy and particularly if it runs in your family. If you experience this and are bothered by it then over the counter Minoxidil (sold as Regaine) may be helpful.

Body Shape Changes

Testosterone treatment causes an increase in muscle and a decrease in fat. This results in increased upper body strength and a more masculine body shape, with a decrease in the hip to waist ratio. The facial features generally coarsen, resulting in a more masculine facial appearance.

Mood

You can expect to feel that you have more energy and an increased sex drive. You may also feel a bit more easily agitated, especially just after your injection is given. Psychologically, you are likely to feel more masculine and generally more settled in your new gender role.

Voice Changes

Testosterone promotes growth in the voice box and vocal cords, which results in the pitch of the voice deepening. The changes can take up to 3 years to complete. Occasionally speech and language therapy is still provided, to work on aspects of the voice other than pitch.

Sexual and Genital Effects

Your sex drive may increase. Your clitoris will grow, often to about 4-5 cm. This usually starts by 3 to 4 months and is complete by one year. The growth is almost never enough to allow penetrative intercourse. A possible complication of testosterone therapy is vaginal dryness and atrophy, and if you have symptoms of this such as thin, dry genital tissue that breaks and bleeds then you can see your GP for a pelvic examination and consideration of local-acting oestrogen formulations to treat this.

Fertility

Being on testosterone will affect your fertility, though it is unclear to what extent. If you would like the possibility of having biological children in the future, either with a partner or via a surrogate, then you will need to take advice from a fertility clinic, think carefully about your options, and should consider freezing some eggs before you start testosterone. Egg freezing is a relatively new procedure and is not a guarantee of future fertility, although the results are better for younger people.

Thus, before commencing hormone treatment we strongly encourage people to consider their fertility options. Funding for gamete storage is increasingly available from local NHS funding bodies and you can see your GP to enquire about funding and a referral to local fertility services.

If, after commencing hormone therapy, you decide to pursue fertility options including pregnancy or fertility preservation via gamete storage, usually you would need to temporarily stop testosterone/hormone therapy for a period of time (with testosterone levels returning to female physiological levels <3 nmol/L) and be referred to local fertility services. Although fertility usually recovers, there is no guarantee as to how soon or how well ovarian function recovers. Furthermore, coming off hormone therapy can result in the return of dysphoria, and temporary reversion of some

of the physical effects of hormone therapy. Pregnancy and the process of gamete storage may also be dysphoric.

The Human Fertilisation & Embryology Authority (HFEA) website also has relevant information: <https://www.hfea.gov.uk/treatments/fertility-preservation/information-for-trans-and-non-binary-people-seeking-fertility-treatment>

After about 6 months of testosterone treatment your ovaries will start to resemble polycystic ovaries, although it is not known if this affects the way they work.

Importantly, despite the effects on fertility, you cannot rely on testosterone treatment as a contraceptive. Pregnancy while on testosterone MUST be avoided as it is harmful to the foetus. If you have partner(s) assigned male at birth then you will need to take appropriate contraceptive measures.

Negative Effects of Hormone Treatment

Testosterone treatment is safe and effective, but several side effects of this treatment have been described in the transmasculine population. The most important of these are thickening of the blood (polycythaemia) and a possible (though seemingly low) risk of endometrial cancer. Liver and cholesterol problems can also occur.

Thickening of the Blood (Polycythaemia)

Testosterone increases the production of red blood cells, which thickens the blood. If the blood becomes too thick then there is a small risk that you could have a stroke. To prevent this, the proportion of red blood cells in your blood will be monitored. If your blood does become too thick, usually all that is necessary is to decrease your testosterone dose or, if you are having injections, to switch to a testosterone gel as these seem to be less likely to thicken your blood.

We know that smoking also increases the risk of having a stroke; in people who smoke and have testosterone treatment this risk is increased even further. We therefore ask that you **stop smoking before you are prescribed testosterone.**

Liver Problems

Severe liver problems can be seen in people using anabolic steroids for bodybuilding. However, these anabolic steroids are different from the testosterone we use in routine testosterone replacement, and severe liver problems associated with this are rare. Mild changes in liver function are more common and occur in about 4-7% of transgender men and transmasculine people, but testosterone treatment rarely needs to be altered as a result.

Cholesterol Problems

There is a large difference in the blood lipids (fat and cholesterol) of cisgender males and cisgender females. This means that cisgender males are more likely to have heart disease than cisgender females. This has led to some concern that testosterone treatment in transgender men and transmasculine people may make their blood lipids similar to those of cisgender men, and may in turn increase their risk of heart disease.

However, studies have shown that testosterone treatment only changes some blood lipids; it does cause a minor increase in triglycerides and a decrease in blood HDL (good cholesterol), but it causes no change in total cholesterol or LDL cholesterol (bad cholesterol). More importantly, the changes that occur do not seem to increase in the risk of heart disease, with the rate of heart attacks being about one third the expected rate in the cisgender male population.

Cancer Risks

Every month the ovaries produce oestrogen, which causes the lining of the womb to thicken, and then progesterone, which reverses this effect. If you take testosterone this will stop your ovaries producing oestrogen and progesterone; however, your body will still produce a small amount of oestrogen as there is a chemical in fat cells that converts testosterone to oestrogen. As there is no progesterone to reverse the effects of this oestrogen, it may cause the lining of the womb to become too thick; this is called endometrial hyperplasia. The concern is that in the longer term this could lead to womb cancer, also called endometrial cancer.

One study suggested that the risk of the lining of the womb thickening is about 15% after 2 years of testosterone treatment, although there is other evidence to suggest that the risk may not be this high. Furthermore, there has reassuringly only been one case of endometrial cancer reported in a transgender man on testosterone treatment, suggesting the risk of this is low. Despite the low risk, if you have symptoms of irregular genital bleeding despite being on testosterone therapy with testosterone levels in target range, we suggest ask your GP to have a pelvic ultrasound scan (to check the womb lining thickness and for other possible causes). This would no longer be necessary after a hysterectomy. The choice and timing of hysterectomy is driven primarily by your preference, rather than medical indication.

The ovarian cancer risk appears to be very low; there have been only three cases reported following prolonged testosterone treatment.

The breast cancer risk appears to be 10 times lower than for cisgender women, and about the same as for cisgender men. Nevertheless, transgender men and transmasculine people would still be advised to perform regular breast self-examination.

Although the risk of developing cancers that could be related to hormone treatment is low, we still **recommend that you have cancer screening in line with national guidelines**. For as long as you have a womb this includes the cervical cancer screening programme, which involves having a **cervical smear every three years from the age of twenty-five**.

[Osteoporosis \(Thin Bones\)](#)

Most of the studies in transgender men and transmasculine people show that testosterone treatment appears to maintain bone mineralisation.

Safety Monitoring

The safety monitoring for testosterone treatment is outlined in the table. This monitoring is designed to detect the major side effects of hormone treatment at an early stage, so that the treatment can be altered to prevent ongoing unwanted effects.

<p>Before starting hormone treatment</p>	<p><u>Bloods:</u> FSH (follicle stimulating hormone) LH (leutenising hormone) Testosterone Oestradiol SHBG (sex hormone binding globulin) Prolactin Full blood count (FBC) Liver function tests (LFTs) Fasting Lipid profile Fasting Glucose and/or Hba1c Vitamin D</p> <p><u>Other:</u> Weight, Height, BMI Blood Pressure</p>
<p>After initiating treatment monitoring is due: 8 weeks after initiating or adjusting testosterone gel therapy, or at the 4th injection after initiating or adjusting Sustanon/Testosterone Enantate therapy, or at the 3rd injection after adjusting Nebido therapy.</p> <p>Additionally, monitoring should be done every 3-6 months in the first year of therapy, every 6-12 months in the second year, and then annually thereafter if therapy is stable.</p>	<p><u>Bloods:</u> Testosterone Full blood count (FBC) Liver function tests (LFTs) Fasting Lipid profile</p> <p><u>Other:</u> Weight, Height, BMI Blood Pressure</p>
<p>If needed</p>	<p>Cervical smear, if uterus (womb) is not removed (follow national guidelines).</p> <p>Pelvic ultrasound scan, if uterus is not removed and there are symptoms of concern or irregular genital bleeding, despite being on testosterone therapy with testosterone levels in target range.</p>

	<p>Mammogram, if breasts are not removed (follow national guidelines).</p> <p>DEXA bone scan, if >12 months without hormone treatment, family history of osteoporosis or a history of low impact fractures.</p>
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Long Term Safety

The treatments we use for transgender men and non-binary people do not seem to alter life expectancy and are safe in the longer term.

Summary

Hormone treatment can be central to the management of gender dysphoria/incongruence, and allows your body to become more congruent with your gender identity. The principal of treatment follows international guidelines.

For transgender men and transmasculine people the hormone regimen consists of testosterone, which can be given as an injection or as a gel.

Testosterone is generally safe if properly prescribed and monitored, but there can be side effects. The most important side effects of testosterone treatment are thickening of the blood (polycythaemia) and thickening of the womb lining. Thickening of the blood can be treated by reducing the dose of testosterone or by changing the form of testosterone that is used. Other more minor side effects of testosterone treatment include increased blood fat levels and minor changes to liver function. Testosterone can also affect genital function which can be treated by using local oestrogen treatment.

However, despite these side effects, transgender men and transmasculine people treated with testosterone have the same life expectancy as the general population, confirming that the treatment is safe. Testosterone treatment is also very successful, and good masculinisation is achieved in the majority of cases.

References

Coleman, E., Radix, A. E., Bouman, W. P., Brown, G. R., de Vries, A. L. C., Deutsch, M. B., ... Arcelus, J. (2022). Standards of Care for the Health of Transgender and Gender Diverse People, Version 8. *International Journal of Transgender Health*, 23(sup1), S1–S259. <https://doi.org/10.1080/26895269.2022.2100644>