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Hormones for Transgender Patients

The chart below provides an overview of hormones that transgender and gender-diverse patients may use to align appearances with gender identity, including general dosing information, anticipated effects, and recommended gender monitoring. Review our resource, *Checklist: Caring for Transgender Patients*, and our CE, *Cultural Competence: LGBTQ Patients*, for more on hormone therapy and other important considerations.

Topic	Medications Used/Effects/Dosing	Monitoring/Screening
<p>Halting or reducing the development of secondary sex characteristics</p> <p>Typically used between Tanner stages two through five (i.e., after the prepubertal period).¹</p>	<ul style="list-style-type: none"> • For adolescents with gender dysphoria (distress or discomfort about the lack of alignment between sex assigned at birth and gender identity), GnRH analogs can be used to halt the development of secondary sex characteristics (e.g., menses, penis/testes/breast development, facial hair).^{1,6} • Long-acting GnRH analogs are preferred (e.g., goserelin [<i>Zoladex</i>; <i>Zoladex LA</i> in Canada], leuprolide [<i>Lupron Depot</i>], histrelin [U.S. only; <i>Supprelin LA</i>], triptorelin [<i>Trelstar</i>]).² • The effects of GnRH analogs on puberty are reversible (i.e., puberty will resume after stopping therapy).¹ • The long-term effects of suppressing puberty with GnRH analogs on bone health and fertility are not known.¹ 	<ul style="list-style-type: none"> • For adolescents receiving GnRH analogs to suppress puberty, monitor the following:² <ul style="list-style-type: none"> ○ every three to six months: clinical pubertal development (e.g., height, weight, blood pressure, breast development, penis/testes development). ○ every six to 12 months: lab work (e.g., luteinizing hormone [LH], follicle stimulating hormone [FSH], estradiol, testosterone, vitamin D). ○ every one to two years: BMD using DXA. • GnRH dosing intervals can be shortened or doses can be increased if there is evidence of progression of puberty (e.g., menses, erections, pubertal hair growth).² • GnRH dosing intervals can be lengthened or doses can be reduced if negative effects of delaying puberty are noted (e.g., halted growth spurt, negative effects on bone).² • Promote effective contraception, as unplanned pregnancies have been reported while receiving GnRH analogs (e.g., condoms, progesterone-only pill, progesterone-containing intrauterine device or implant, medroxyprogesterone injection).¹

Topic	Medications Used/Effects/Dosing	Monitoring/Screening
<p>Masculinizing hormones for transgender males (those assigned female at birth who identify as male)</p>	<ul style="list-style-type: none">• Testosterone is used for masculinization.^{1,6}<ul style="list-style-type: none">○ Partially reversible changes from testosterone include skin, muscle, and fat deposition changes.¹○ Irreversible changes from testosterone (once they appear) include protrusion of the Adam’s apple, voice changes, and male pattern baldness.¹○ The reversibility of testosterone’s effects on fertility are not known.¹• Usually injectable (subcutaneous may be less painful than IM administration) or transdermal testosterone is used. Testosterone can be started as young as 13 to 16 years old. Generally, expect to see individualized doses in the ranges below:^{2,4,6,7}<ul style="list-style-type: none">○ to induce puberty (adolescents): injectable (IM or subcutaneous): 25 to 100 mg/m² every two weeks. (with gradual titrations every six months).○ post-pubertal: ~75 to 125 mg/m² every two weeks.○ adult injections: 100 to 200 mg IM every two weeks or 50 to 100 mg subcutaneously every week (enanthate or cypionate); 1,000 mg IM every 12 weeks (undecanoate).○ adult transdermal: 50 to 100 mg/day (gel) OR 2.5 to 10 mg/day (patch).<ul style="list-style-type: none">▪ Counsel patients using testosterone gel to apply the gel to an area that is usually covered by clothing and to wash their hands after each application. These steps will minimize the risk of inadvertent testosterone exposure to others.⁶• Masculinizing effects of testosterone can take months to years. For example, within one to six months of therapy patients may experience acne, cessation of menses, vaginal atrophy, clitoral enlargement. Within six to 12 months of therapy patients may notice facial hair, increased muscle mass, and deepening of voice. It can take up to five years to see the full effects.^{2,6}	<ul style="list-style-type: none">• Transgender males receiving testosterone therapy may be at risk for adverse effects that can include:^{2,6}<ul style="list-style-type: none">○ erythrocytosis (hematocrit >50%)○ hypertension and hyperlipidemia○ breast or uterine cancer• Evaluate patients every three months for the first year of therapy, and then once or twice a year thereafter to watch for virilization and adverse effects.^{2,6}• Check hemoglobin (hgb)/hematocrit (hct) or complete blood count (CBC) at baseline, after one month (Canada), every three months, and then at least yearly to look for erythrocytosis (hct >50%).^{2,6}• Regularly check weight, blood pressure, and lipids.^{2,6}• Check serum testosterone every three months until goal serum testosterone levels between 400 and 700 ng/dL (~14 to 24 nmol/L) are achieved.² When levels are checked is based on the testosterone formulation being used:²<ul style="list-style-type: none">○ enanthate or cypionate injections: midway between injections.○ undecanoate injections: just before the next injection.○ transdermal: no sooner than after one week of daily use and at least two hours AFTER application.• Follow cancer screening guidelines (e.g., cervical, breast).^{2,6}• Promote effective contraception, since transgender males can become pregnant and testosterone is contraindicated during pregnancy (e.g., progesterone-containing intrauterine device or implant, medroxyprogesterone injection).⁶• Involve endocrinology to ensure BMD testing in appropriate patients based on age, risk factors, and hormone therapy.^{2,6}• In addition, for adolescents receiving testosterone monitor:²<ul style="list-style-type: none">○ clinical pubertal development every three to six months (e.g., height, weight, blood pressure, breast development).○ BMD using DXA every one to two years○ vitamin D levels every six to 12 months

Topic	Medications Used/Effects/Dosing	Monitoring/Screening
<p>Feminizing hormones for transgender females (those assigned male at birth who identify as female)</p>	<ul style="list-style-type: none"> • Estrogen is used for feminization.^{1,6} <ul style="list-style-type: none"> ○ Partially reversible changes from estrogen are changes in skin, muscle mass, and fat deposition.¹ ○ Breast development is thought to be irreversible.¹ ○ Reversibility of estrogen's effects on fertility unknown.¹ • Injectable, oral, or transdermal estrogen can be used. <ul style="list-style-type: none"> ○ There may be lower risk of thromboembolism with injectable or transdermal delivery.^{2,6} ○ Oral therapy may cost less and be easier to titrate.^{2,8} • Can be started as young as 13 to 16 years old. Generally, expect to see individualized doses of 17β-estradiol (unless otherwise noted) (avoid ethinyl estradiol due to increased risk of thromboembolism) in the ranges below:^{2,5-7} <ul style="list-style-type: none"> ○ to induce puberty (adolescents) using gradual dosage titrations about every six months: <ul style="list-style-type: none"> ▪ oral: 5 to 20 mcg/kg/day ▪ transdermal: 6.25 to 37.5 mcg/24 hours (cut patches for doses <25 mcg/24 hours). Changed 2x/week. ○ post-pubertal oral doses: ~1 to 2 mg/day ○ adult doses: <ul style="list-style-type: none"> ▪ oral or sublingual: 2 to 6 mg/day (Canada: max 4 mg/day) ▪ injections: estradiol valerate 5 to 30 mg IM (every two weeks) or estradiol cypionate 2 to 10 mg IM (weekly) ▪ transdermal: 0.025 to 0.4 mg/day (changed 2x/week) • Can add antiandrogens, (e.g., GnRH analogs; spironolactone [usually 50 to 400 mg/day]; or cyproterone [only available in Canada (usually 25 to 100 mg/day)]).^{2,3,6} • 5-alpha reductase inhibitors are sometimes used (e.g., unable to tolerate spironolactone, seeking partial feminization),⁴ but they do NOT lower testosterone levels and have adverse effects. • Feminizing effects can take months to years. For example, within 1 to 3 months of therapy patients may note a decreased sex drive and spontaneous erections.^{2,6} Within 3 to 12 months of therapy patients may note redistribution of body fat, decreased muscle mass, and breast development. It can take up to five years to see the full effects.^{2,6} 	<ul style="list-style-type: none"> • Transgender females receiving estrogen therapy are at risk for adverse effects that can include:^{2,6} <ul style="list-style-type: none"> ○ blood clots (especially if >40 years old, obese, or smokers) ○ macroprolactinoma (noncancerous pituitary gland tumor) ○ breast cancer ○ coronary artery disease ○ cholelithiasis (gallstones) ○ high triglyceride levels • Evaluate adult patients every three months for the first year of therapy, and then once or twice a year thereafter to watch for feminization and adverse effects.^{2,6} • Measure serum testosterone and estradiol levels every three months. Goal levels are:^{2,6} <ul style="list-style-type: none"> ○ estradiol: 100 to 200 pg/mL (<150 pmol/L in Canada) ○ testosterone: <50 ng/dL (1.8 nmol/L) • If patients are taking spironolactone check potassium levels before starting spironolactone, before dosage changes, and then yearly once on a stable dose. Spironolactone can lead to hyperkalemia.^{2,3,6} • Promote effective contraception, as estrogen therapy may not completely prevent sperm production.^{2,6} • Involve endocrinology to ensure BMD testing in appropriate patients based on age, risk factors, and hormone therapy.^{2,6} • Involve specialists to ensure cancer screenings in appropriate patients, based on age, risk factors, and hormone therapy, including breast cancer if receiving estrogen therapy.^{2,6} • In addition, for adolescents receiving estrogen, monitor:² <ul style="list-style-type: none"> ○ clinical pubertal development every three to six months (e.g., height, weight, blood pressure, breast development, penis/testes development). ○ BMD using DXA every one to two years. ○ prolactin, estradiol, vitamin D levels every six to 12 months.

Abbreviations: BMD = bone mineral density; DXA = dual-energy X-ray absorptiometry; GnRH = gonadotropin-releasing hormone; IM = intramuscular.

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