



Bone Health: Puberty Blockers Not “Fully Reversible”

By / October 20, 2021

Written by Simon Tegg, who is part of [Fully Informed](#), a group of people from across New Zealand concerned about the legality and long-term impacts of prescribing puberty blockers to children.

Please use hashtag #WorldOsteoporosisDay

October 20 is [World Osteoporosis Day](#). Osteoporosis affects a huge number of us as we get older, contributing to bone fractures in 1 in 3 women and 1 in 5 men over 50. These fractures can be life threatening and cause ongoing disability.

The [website](#) includes a risk factor tool where you can enter your details and get a summarised assessment of your osteoporosis risk. Clicking through the tool, you will be asked if you've ever had “*Androgen deprivation therapy used to treat prostate cancer.*” ‘Androgen deprivation therapy’ is of course GnRH agonists, the same class of drugs used to block puberty in gender-dysphoric adolescents. A question asking about puberty suppression is missing from the tool because it's targeted at older people, while the adolescents treated with GnRH agonists are still young and the treatment is relatively novel. This article outlines the existing research on puberty suppression and its impacts on bone health for these young people.

What is the state of the research?

The research on the bone health impacts of puberty suppression is quite limited. There are only seven [studies](#) that track bone health impacts, two published this year. None have controls. Nevertheless, we know more about the impacts of puberty blockers on bone health than on cognitive or emotional development, for example. Clinicians who suppress puberty in adolescents know that they're likely increasing the risk, and consent forms include warnings about unknown long-term impacts on bone health.

How does puberty suppression impact bone density?

Sex hormones are important to maintaining healthy bones. This is why postmenopausal women and men treated for prostate cancer have a greater risk

of osteoporosis after sex hormone production declines or is halted with treatment. For adolescents treated with GnRH agonists, the impacts are especially concerning. Puberty is when adolescents gain adult levels of bone density; without sex hormones, the research indicates that absolute bone density usually flatlines or declines while on treatment. Flatlining bone density in adolescence represents a failure to accumulate adult bone density, and a decline in bone density relative to peers. Declining absolute bone density during adolescence is even more serious.

Across the studies and all measures of bone density, treated adolescents lost around -0.8 of a standard deviation compared to peers, with a wide range of outcomes depending on the measured location (measured at the spine or hip, etc.). In adults, bone density more than -1 standard deviations below the mean and more than -2.5 standard deviations is considered to be *osteopenia*. Bone density below -2.5 (or the 0.6th percentile) standard deviations is considered *osteoporosis*. However, adolescent bone density is interpreted differently. Below -2 standard deviations is considered "low for age," and a diagnosis of paediatric osteoporosis also relies on fracture history.

Gender-dysphoric males in particular have lower than average bone density before starting GnRHa treatment. This is probably due to this group getting less exercise and sunshine than peers. A significant minority will be classified as 'low for age' after GnRH agonist treatment. Most studies have not tracked fractures, so we don't know if the treatment has induced paediatric osteoporosis.

Does bone density recover after the treatment is withdrawn?

Only four studies have examined the recovery of bone density after GnRH agonist treatment but only follow up with patients who received cross-sex hormones after GnRHa. No studies have looked at patients who discontinued GnRHa and did not receive cross-sex hormones.

In the three studies mentioned, females who went on to testosterone treatment recovered to the normal range if somewhat below baseline values for most measures of bone density.

For males, the picture is less clear. Some measures recovered, some showed no improvement, and a small number showed further declines.

Implications

For men treated with GnRH agonist for prostate cancer, "[the cessation of \[treatment\] does not guarantee the recovery of bone to the previous status.](#)" Given the results above, it's reasonable to conclude that the same is true for adolescents as well, and that treated adolescents will be more likely to develop osteoporosis later in life. Describing GnRHa treatment for adolescents as "fully reversible" is misleading if not downright dishonest.

Image credit: Ivan Samkov, Pexels

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