Hormone treatment in transgender persons could shed light on role of sex hormones in bone density

Male-to-female (MtF) transgender persons have a greater increase in bone mineral density than female-to-male (FtM) persons in their first year of hormone treatment. The research, presented at the European Congress of Endocrinology in Munich, helps scientists further understand the roles sex hormones play on bone development and maintenance in both sexes.

As the number of people seeking gender reassignment treatment continues to increase globally, there is an ever-greater need for scientists and clinicians to understand the effects of cross-gender hormonal treatment on the human body. Within the first year of gender transition, applicants are treated with sex hormones: MtF persons receive oestrogen, whilst FtM persons receive testosterone.

It is known that oestrogen increases bone density, however, whilst it is known that testosterone increases bone size, its effects on bone density are still unknown. To further investigate, a research team from VU University Medical Centre in Amsterdam completed an observational study of 188 adults undergoing hormone treatment for gender reassignment. Bone mineral density was measured both before and after one year of hormone treatment; the results showed that MtF persons receiving oestrogen had an average increase in spine bone density of 3.72%, compared to only a 1% increase in FtM persons receiving testosterone.

These results confirm our understanding that oestrogen increases bone density, and suggest that testosterone does not, or does so to a lesser extent. Interestingly, in FtM transgender persons who were post-menopausal with low pre-treatment oestrogen levels, bone density of the spine was seen to increase by 4.5% following testosterone treatment.

“As this increase was only found in those with low pre-treatment oestrogen levels, it might suggest that in biological adult women (pre-menopause) testosterone primarily affects bone density through its conversion into oestrogen,” said Dr Chantal Wiepjes, lead author of the study.

“Our next steps will be to investigate what the long-term effects of hormone treatment are on bone density. Patients undergoing hormone therapy routinely have bone density scans, which might give them the impression that hormone treatment can have adverse effects on their bones. Therefore, a more solid molecular long-term understanding of the changes may reassure them,” continued Dr Chantal Wiepjes. “I also think transitioning patients should be aware that the changes caused by these hormones aren’t just external – their internal structure changes too”.

As well as improving understanding of treatments within the transgender community, by studying the effects of cross-sex hormone treatment, the team hopes to more clearly understand the role of oestrogen in biological males, and the role of testosterone in biological females.

Whilst it should be noted that the observational study did not compare results to a control group, the team feel that differences seen in post-menopausal FtM persons suggest that it is unlikely the changes in bone density seen were merely due to age or timing.

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Abstract

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An increase of bone mineral density in male-to-female and female-to-male transgender persons after one year cross-sex hormonal treatment

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Introduction: Estrogen has positive effects on bone mineral density (BMD), in particular in trabecular bone through inhibition of bone resorption. Testosterone increases bone size, but the effect on BMD is less clear. Cross-sex hormonal treatment (CSHT) in transgender individuals can affect BMD. Therefore, the aim of this study is to investigate effects of CSHT on BMD during the first year of treatment in male-to-female (MtFs) and female-to-male (FtMs) transgender persons.

Methods: This is a prospective observational study and part of ENIGI (European Network for Investigation of Gender Incongruence). 188 adults who completed one year of CSHT were included. In 99 FtMs and 89 MtFs a dual-energy X-ray absorptiometry was performed to measure lumbar spine (LS) and total hip (TH) BMD before and after one year CSHT. FtMs received intramuscular testosterone undecanoate (1000mg/12 weeks), testosterone gel (50mg/day) or testosterone esters intramuscular (250mg/2 weeks). MtFs were treated with cyproteronacetate (50mg/day) in combination with oral estradiol valerate (2-4mg/day) or an estradiol patch (200ug/week). Analyses were stratified for calcium with colecalciferol (CaD3) use.

Results: In FtMs the mean LS BMD increased with 1.00% (95%CI 0.15 – 1.85%) and the mean TH BMD with 0.91% (95%CI 0.29 – 1.53%). In MtFs, the mean LS and TH BMD increased with 3.72% (95%CI 2.85 - 4.59%) and 1.52% (95%CI 0.90 – 2.14%), respectively. In MtFs who used CaD3, BMD increased more than in patients who did not use this: 4.87% (95%CI 3.49 – 6.25%) vs. 2.86% (95%CI 1.76 – 3.95%) in LS, and 2.33% (95%CI 1.27 – 3.38%) vs. 0.92% (95%CI 0.18 – 1.66%) in TH. In FtMs, use of CaD3 did not influence the change of LS or TH BMD.

Conclusion: After one year CSHT BMD increases in MtFs more than in FtMs, particularly in lumbar spine. This confirms the role of estrogen on bone in biological males.

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Notes for Editors

1. For further information about the study please contact:

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2. The study "An increase of bone mineral density in male-to-female and female-to-male transgender persons after one year cross-sex hormonal treatment" will be presented at 11.45AM on Tuesday 31 May 2016 at the European Congress of Endocrinology at the ICM in Munich, Germany.

3. For other press enquiries, or copies of the abstract, please contact the ECE 2015 press office:

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4. The European Congress of Endocrinology is held at the Internationales Congress Center München between 28-31 May 2016.

5. The European Society of Endocrinology was created to promote research, education and clinical practice in endocrinology by the organisation of conferences, training courses and publications, by raising public awareness, liaison with national and international legislators, and by any other appropriate means.