

Changes in body composition during late puberty. The effect of sudden sex hormone withdrawal.

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Introduction

The sex hormones initiate profound physical and physiological changes during the pubertal process, but to what extent are they responsible for continuing the body composition changes of late adolescence?

AIM: To examine the effect on body composition of sudden sex hormone withdrawal to gain insight into their action.

Results

The effect of GnRH analogues differed between (natal) males and (natal) females. On average, the mean BMI for females increased by 1.2 whilst the BMI fell for males by 0.25.

Paired T-test analysis demonstrated a significant fall in height and lean mass standard deviation in males ($p=0.01$ for height and 0.002 for lean mass); there was however no significant differences in females for any measurement.

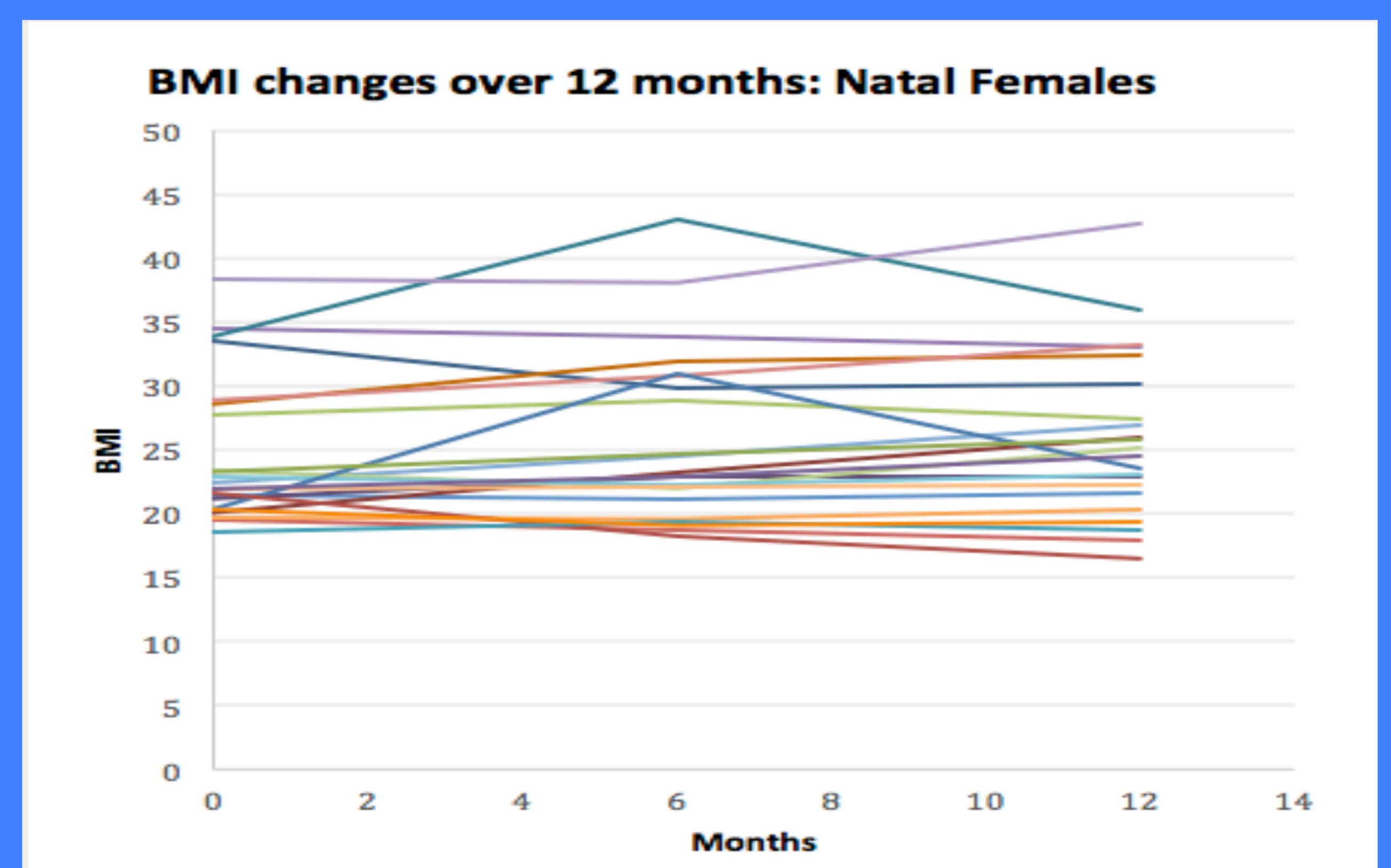
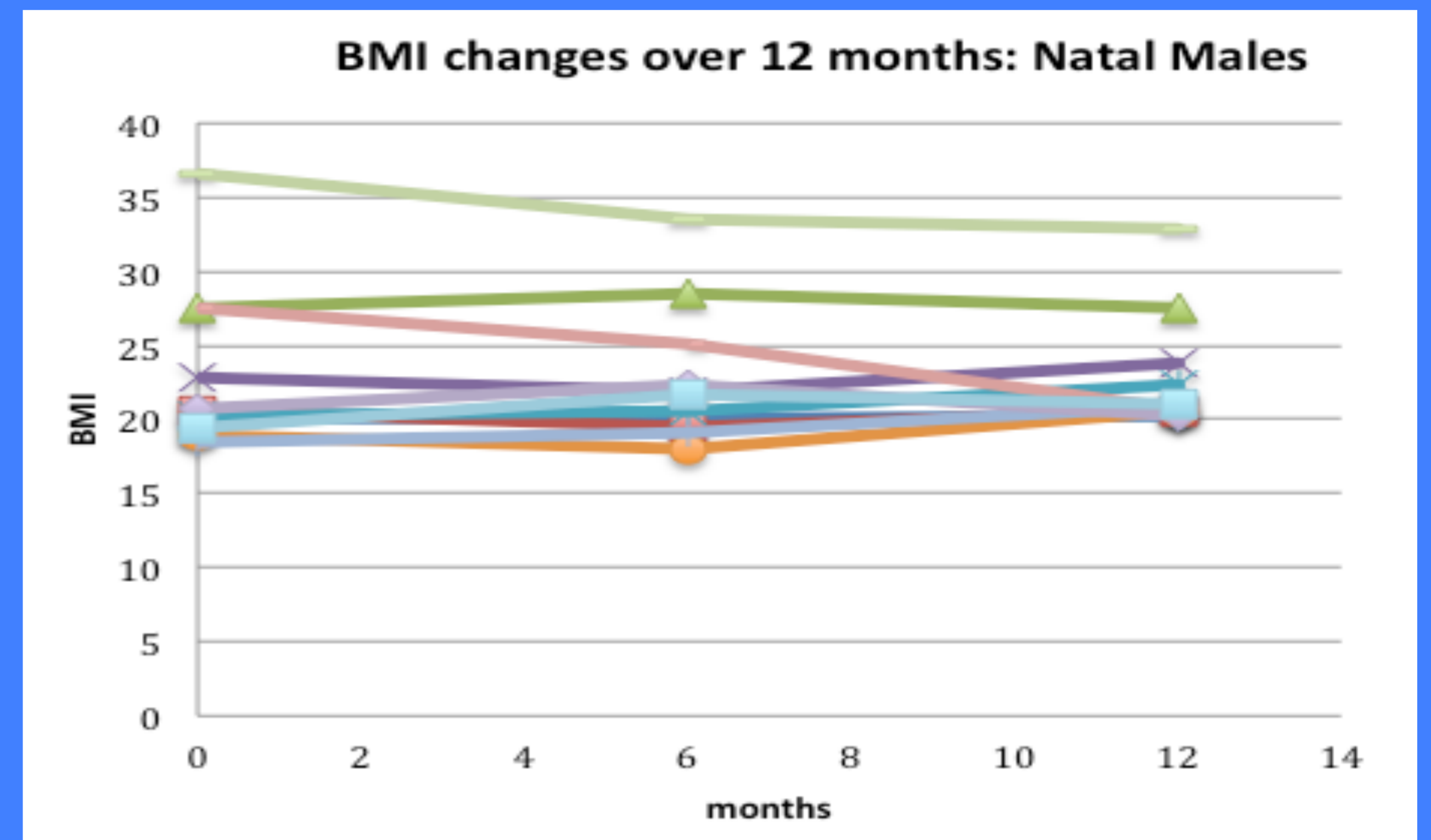
The height, weight, lean mass and BMI SD scores of our cohort were also compared to a reference data set (UK 90 data) using a one sample t test (against 0).

The mean height and lean mass SD scores for the males were less than expected at all time points: for example height at baseline $t=-5.745$ ($p<0.01$) and after 12 months of treatment $t=-6.041$ ($p<0.01$). There was however no significant difference for weight and BMI SD scores between the males and the reference population.

In contrast, one sample t-test analysis in females on GnRH treatment revealed a significant increase in weight and BMI SD scores compared to the reference population at all time points. The weight at baseline $t= 3.107$ ($p=0.005$) and the weight after 12 months of treatment $t=3.226$ ($p=0.004$) demonstrated an increase compared to the reference population. BMI also remained high with a baseline t score 4.144 ($p<0.01$) and 12 month t score 3.791 ($p<0.01$). There was however no difference in height or lean mass SD scores .

Patients & Method

36 healthy phenotypically and chromosomally normal postpubertal individuals aged 15-17 years with gender dysphoria (M=11; F=25) underwent Tanita body composition analysis at 0, 6 and 12 months during reproductive hormone suppression with leuprorelin (Gonapeptyl Depot 3.75mg) four weekly as part of the standard therapeutic protocol. Sex hormone suppression was confirmed biochemically. A database was then created and SD scores were calculated and compared using one sample & paired T test.



Discussion

In males, we discovered a significant reduction in the rate of height velocity and lean mass. This could potentially be a beneficial consequence in those desiring a more 'female' body appearance and confirms the role of male sex hormones in growth and the accrual of muscle mass. The changes shown in males are likely to be a reflection of late pubertal developments being halted by the GnRH analogue.

There were however no significant differences in body composition found for the female patients on GnRHa treatment and this is likely due to the majority of the cohort being post-pubertal.

Future research will include the effects of cross hormone treatment on body composition in this gender dysphoria cohort, should they wish to continue to full sex change, as this is an option in the treatment regimen.

Conclusion

The body composition changes on sex hormone withdrawal in late-adolescence appear to be significant in males only.

Interestingly however, these changes are much less profound than the equivalence in middle age. It is possible therefore, that other factors may preserve normal body balance even in the absence of sex hormone secretion and this will require further study.