

## Differential effects of testosterone treatment on bone density and body composition in men with classical vs functional hypogonadism

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**No Conflicts of Interest for all Authors**



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# Introduction and Objective

There are limited data on Testosterone (T) therapy  
in men with

**functional hypogonadism (FH)**  
compared to those with

classical forms (primary/secondary hypogonadism, PH/SH)

regarding bone density and body composition

# Methods

Registry data of 2-5 years comprising 189 patients

including 67 men with PH (mean age  $32.0 \pm 10.1$  years),  
49 with SH (mean age  $30.4 \pm 9.4$  years) and  
73 with FH (mean age  $44.8 \pm 11.6$  years)  
all receiving uniform treatment  
using intramuscular T undecanoate (1000 mg).

All patients received annual assessments of bone density  
and body composition  
using dual-energy X-ray absorptiometry

# Results I

Serum T concentrations increased from  $6.8 \pm 2.7$  nmol/L to  $18.1 \pm 2.9$  nmol/L in men with PH/SH and from  $7.9 \pm 2.5$  nmol/L to  $17.3 \pm 3.2$  nmol/L in men with FH.

There was an initial difference in bone density between patient groups

T-Score lumbar spine:

PH:  $-1.8 \pm 0.3$ , SH:  $-2.3 \pm 0.4$ , FH:  $-1.2 \pm 0.3$ , all  $p < 0.001$  vs each other

T-Score hip:

PH:  $-1.4 \pm 0.3$ , SH:  $-1.7 \pm 0.4$ , FH:  $-1.1 \pm 0.3$ , all  $p < 0.001$  vs each other

## Results II

Body fat content was higher ( $p < 0.001$ ) in FH ( $38\% \pm 10$ ) than in PH ( $28\% \pm 6$ ) and SH ( $30\% \pm 5$ ).

Lean body mass was lower in FH compared to PH/SH (both  $p < 0.001$ )

# Results III

Changes over time using Kaplan-Meier models revealed fundamental differences in inter-individual effects:

men with FH were more likely to lose body fat and gain lean mass compared to men with PH/SH

(hazard ratio 1.4 [1.2-1.6],  $p=0.006$

and hazard ratio 1.3 [1.1-1.6],  $p=0.009$ ).

# Results IV

A significant increase in bone density was observed for all patient groups

(lumbar spine and hip, both  $p < 0.001$ )

The effect was least pronounced in FH and strongest in SH

(lumbar spine:  $p = 0.008$  and hip:  $p = 0.01$ , post-hoc tests).



# Results V

**Stepwise multiple Cox regression models could attribute differences of changes in bone density to the different baseline characteristics between groups including age and delta T levels.**

Patients were more likely to gain bone mass when they

- were younger (p=0.004)
- had lower baseline serum testosterone (p=0.009)
- had lower baseline bone density (p<0.001)

## Results VI

**There was no difference between groups for the overall increase in hematocrit.**

**Changes in PSA levels were more likely to occur in FH (hazard ratio 1.4 [1.2-1.6], p=0.004).**

# Conclusions

- **This study provides major new findings regarding effects of T therapy in different groups of hypogonadal men.**
- **Patients with FH experience greater benefits in losing fat mass and gaining lean mass than men with classical forms of hypogonadism**
- **Men with classical forms of hypogonadism have a more pronounced increase in bone density than patients with FH.**