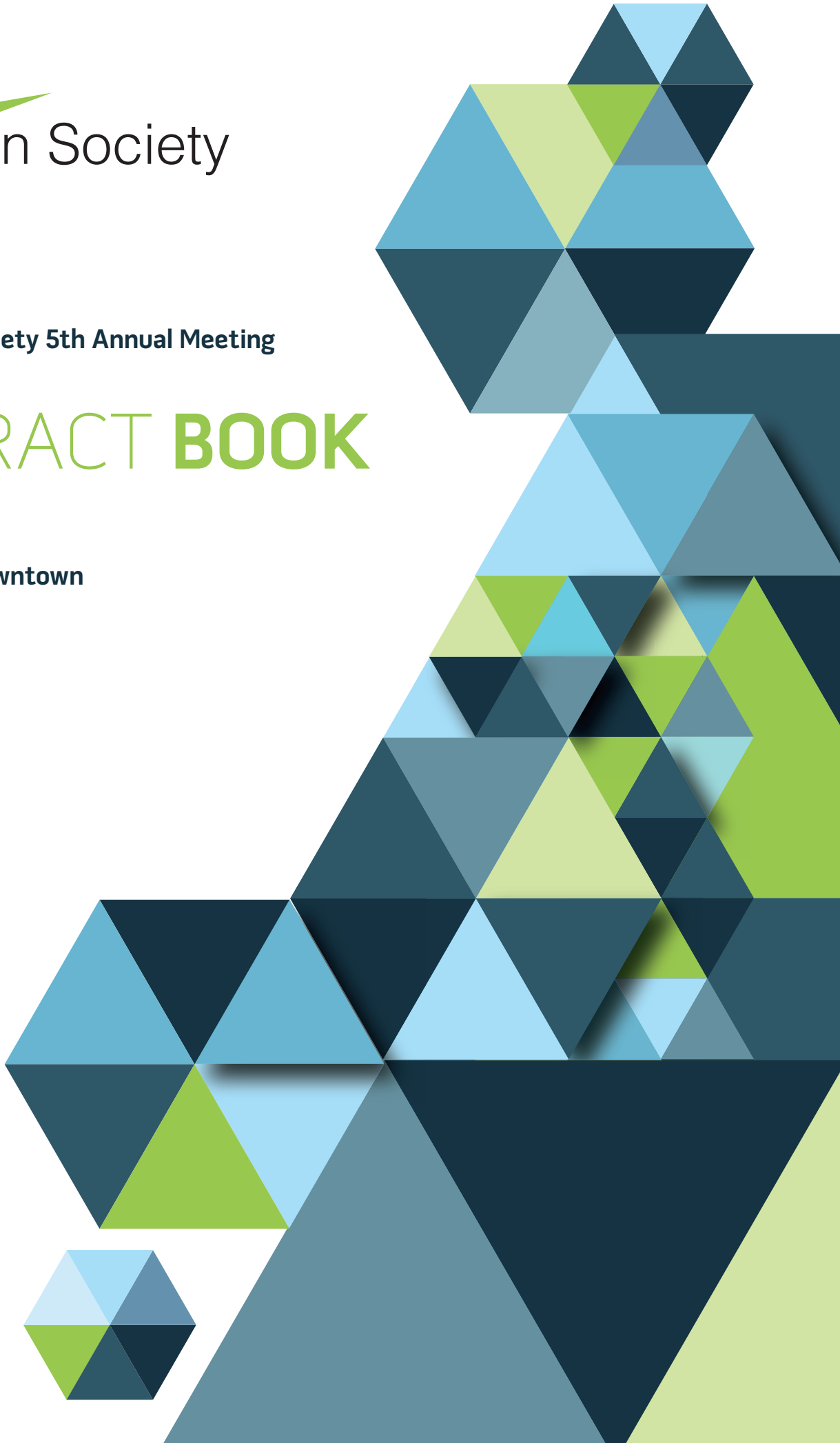
Androgen Society

The Androgen Society 5th Annual Meeting

# ABSTRACT **BOOK**

**MARCH 2-4, 2023**
**Marriott Dallas Downtown**
**Dallas, Texas**



**#1**

# TESTOSTERONE BOOSTER SUPPLEMENTS SOLD ON AMAZON MARKETPLACE: IS THERE EVIDENCE SUPPORTING THEIR EFFICACY AND SAFETY?

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**Introduction**:
As the population ages, the prevalence of age-related hypogonadism is expected to rise.[1,2] Testosterone (T) prescriptions have increased over the last two decades to address this increasing demand.[1] Dietary supplements have gained in popularity, as they are more accessible since the advent of online marketplaces and relaxed regulatory testing protocols for safety and effectiveness.[3,4] Composition, efficacy, and safety of these supplements are not thoroughly investigated.

**Objectives**:
1. Determine the product characteristics and claims made by the Top 50 T supplements advertised on Amazon Marketplace.
2. Determine the cost to the consumer and customer satisfaction with these products.

**Methods**:
The top 50 T supplements were determined by visiting the Amazon page, "Best Sellers in Sports Nutrition T Boosters," which lists the top products based on sales and revenue.
Active ingredients, number of active ingredients, 30-day costs, 5-star ratings, refunds, and claims of these products were documented. Ingredients present in a minimum of 50% of products were analyzed.

**Results**:
There was significant variability among the top 50 supplements, with 129 unique ingredients identified. The average 30-day cost of a product was $25.95, and most were nonrefundable (94%). Tongkat Ali Root Extract (*Eurycoma Longifolia*, EL) was the most common ingredient found in most supplements analyzed (59%). Two randomized controlled trials analyzed EL for efficacy.[5,6] The results of one trial were confounded by an exercise regimen performed by participants, and the other trial only analyzed 32 patients.[5,6] No clinical trial has examined the safety profile of EL in patients.

**Conclusions**:
There is large heterogeneity in the composition of T supplements bartered on Amazon Marketplace. These products can present a significant 30-day cost to patients despite having no strong evidence regarding efficacy or safety. Further research is needed to investigate the safety profile and efficacy of these supplements.

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#2

# COMPARISON OF EFFECTS OF LONG-TERM TESTOSTERONE THERAPY (TTH) ON SEXUAL AND URINARY FUNCTION AND QUALITY OF LIFE OVER 14 YEARS IN MEN WITH PRIMARY VS. FUNCTIONAL HYPOGONADISM

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**Introduction:**
The FDA recommends treating hypogonadism only in men with "certain medical conditions" but not low testosterone due to aging. In contrast, the indication for TTh accepted by EMA is male hypogonadism, when testosterone deficiency has been confirmed by clinical features and biochemical tests.

**Methods:**
In an ongoing registry, 481 men receive TTh. 79 have primary hypogonadism (Klinefelter's syndrome, orchiectomy, cryptorchidism), 402 functional hypogonadism. Men are treated by testosterone undecanoate (TU) injections 1000mg/12weeks following an initial 6-week interval. Means and standard deviations of absolute measures over 14 years are reported. Changes over time between groups were compared by a mixed effects model for repeated measures with a random effect for intercept and fixed effects for time, group and their interaction, and adjusted for age, weight, waist circumference, blood pressure, fasting glucose, lipids and quality of life to account for baseline differences between groups.

**Results:**
Mean age at baseline: 49.7±9.4 (primary), 57.8±7.0 (functional) ($p<0.0001$). Mean (median) follow-up: primary 11.4±2.9(13), functional 10.9±3.2(12) years.

Use of PDE5 inhibitors at baseline: 15.2% (primary) and 28.6% (functional) ($p<0.05$). Use of alpha-blockers at baseline: 6.3% (primary) and 42.5% (functional) ($p<0.0001$).

IIEF-EF increased from 18.5±6.0 to 29.6±0.6 (primary) and from 17.1±5.8 to 29.5±0.9 (functional) after 14 years ($p<0.0001$ for both).

Self-reported sexual frequency per month increased from 4.0±1.4 to 10.1±1.1 (primary) and from 3.6±1.3 to 9.8±1.6 (functional) after 14 years ($p<0.0001$ for both).

IPSS decreased from 3.1±3.0 to 1.0±0.6 (primary) and from 7.1±3.5 to 1.6±0.7 (functional) after 14 years ($p<0.0001$ for both).

Post-voiding residual bladder volume (mL) decreased from 26.0±19.2 to 10.0±2.7 (primary) and from 55.5±24.3 to 10.4±1.9 (functional) after 14 years ($p<0.0001$ for both). There was a statistically significant change between groups after 14 years which was not considered clinically meaningful.

AMS decreased from 49.8±9.8 to 17.2±0.4 (primary) and from 53.6±9.7 to 17.2±0.4 (functional) ($p<0.0001$ for both).

**Conclusion:**
Effects of long-term TTh on sexual and urinary function and quality of life in men with primary and functional hypogonadism were in a similar magnitude.

**Disclosures:**

The study is partially funded by Grünenthal GmbH, Aachen, Germany F Saad is a full-time employee of Grünenthal GmbH, Aachen, Germany
A Haider has received research grants from Grünenthal GmbH, Aachen, Germany
KS Haider has received research and travel grants from Grünenthal GmbH, Aachen, Germany

#3

# COMPARISON OF EFFECTS OF LONG-TERM TESTOSTERONE THERAPY (TTH) ON LIPID PATTERN OVER 14 YEARS IN MEN WITH PRIMARY VS. FUNCTIONAL HYPOGONADISM

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**Methods:**
In an ongoing registry, 481 men receive TTh. 79 have primary hypogonadism (Klinefelter's syndrome, orchiectomy, cryptorchidism), 402 functional hypogonadism. Men are treated by testosterone undecanoate (TU) injections 1000mg/12weeks following an initial 6-week interval. Means and standard deviations of absolute measures over 14 years are reported. Changes over time between groups were compared by a mixed effects model for repeated measures with a random effect for intercept and fixed effects for time, group and their interaction, and adjusted for age, weight, waist circumference, blood pressure, fasting glucose, lipids and quality of life to account for baseline differences between groups.

**Results:**
Mean age at baseline: 49.7±9.4 (primary), 57.8±7.0 (functional) ($p<0.0001$). Mean (median) follow-up: primary 11.4±2.9(13), functional 10.9±3.2(12) years.

Total cholesterol (TC) (mmol/L for all lipids) decreased from 7.11±0.84 to 4.87±0.19 (primary) and from 7.96±1.07 to 5.00±0.24 (functional) after 14 years ($p<0.0001$ for both).

HDL increased from 0.92±0.25 to 1.43±0.24 (primary) and from 0.98±0.34 to 1.62±0.28 (functional) ($p<0.0001$ for both).

LDL decreased from 4.06±0.90 to 2.50±0.29 (primary) and from 4.36±0.91 to 2.41±0.25 (functional) ($p<0.0001$ for both).

Triglycerides (TG) decreased from 2.80±0.45 to 2.10±0.09 (primary) and from 3.23±0.59 to 2.12±0.08 (functional) ($p<0.0001$ for both).

Non-HDL decreased from 6.19±0.85 to 3.44±0.28 (primary) and from 6.98±1.07 to 3.38±0.25 (functional) ($p<0.0001$ for both).

Remnant cholesterol decreased from 2.13±0.66 to 0.93±0.29 (primary) and from 2.62±0.87 to 0.97±0.26 (functional) ($p<0.0001$ for both).

**Conclusion:**
Effects of long-term TTh on lipid pattern in men with primary and functional hypogonadism were in a similar magnitude.

**Disclosures:**
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#4

# COMPARISON OF EFFECTS OF LONG-TERM TESTOSTERONE THERAPY (TTH) ON ANTHROPOMETRIC MEASURES OVER 14 YEARS IN MEN WITH PRIMARY VS. FUNCTIONAL HYPOGONADISM

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[3]*Research Department, Gulf Medical University, Ajman, UAE*

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**Methods:**
In an ongoing registry, 481 men receive TTh. 79 have primary hypogonadism (Klinefelter's syndrome, orchiectomy, cryptorchidism), 402 functional hypogonadism. Men are treated by testosterone undecanoate (TU) injections 1000mg/12weeks following an initial 6-week interval. Means and standard deviations of absolute measures over 14 years are reported. Changes over time between groups were compared by a mixed effects model for repeated measures with a random effect for intercept and fixed effects for time, group and their interaction, and adjusted for age, weight, waist circumference, blood pressure, fasting glucose, lipids and quality of life to account for baseline differences between groups.

**Results:**
Mean age at baseline: 49.7±9.4 (primary), 57.8±7.0 (functional) ($p<0.0001$). Mean (median) follow-up: primary 11.4±2.9(13), functional 10.9±3.2(12) years.

Weight (kg) decreased from 96.6±14.1 to 81.4±5.5 (primary) and from 106.9±17.3 to 83.9±7.4 (functional) after 14 years ($p<0.0001$ for both). There was no statistically significant change between groups after 14 years.

Weight loss (%) was 19.0±6.9 (primary) and 19.5±8.3 (functional) ($p<0.0001$ for both). There was no statistically significant change between groups after 14 years.

BMI (kg/m²) decreased from 29.2±4.6 to 24.4±1.8 (primary) and from 34.3±5.4 to 27.2±2.4 (functional) ($p<0.0001$ for both). There was no statistically significant change between groups after 14 years.

Waist circumference (WC;cm) decreased from 102.7±7.6 to 94.2±3.4 (primary) and from 111.4±14.4 to 95.7±4.8 (functional) ($p<0.0001$ for both). There was a statistically significant change between groups after 14 years which was not considered clinically meaningful (9.04±3.96% and 10.69±4.73%).

Waist:Height ratio (WHR) decreased from 0.56±0.05 to 0.52±0.02 (primary) and from 0.63 ±0.08 to 0.54±0.03 (functional) ($p<0.0001$ for both). AMD was statistically significant for the first three years and the last three years.

**Conclusion:**
Effects of long-term treatment with TU on anthropometric measures in men with primary and functional hypogonadism were in a similar magnitude.

**Disclosures:**
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**#5**

# WELLNESS AND PREVALENCE OF HYPOGONADISM AMONG MALE RESIDENT PHYSICIANS

Gene Austin Krishingner, MD; Chase, Mallory, M; Kevin Campbell, MD

**Introduction:**

Resident physicians represent a vulnerable population, often subjected to long working hours, atypical sleep schedules, and high-stress working environments. These conditions have been associated with decreased wellness and hypogonadism in other populations; however, hypogonadism has been inadequately studied in this unique population.

Symptoms of hypogonadism have a high degree of overlap with conditions such as burnout and depression, both of which have been well-established in this population. Herein we seek to evaluate wellness and prevalence of hypogonadism among male resident physicians.

**Methods/Materials:**

This is a prospective study to evaluate male physicians in medical training who elected to undergo wellness screening at our institution. Following approval by the Institutional Review Board, participants were contacted via e-mail regarding participation in men's health screening. Baseline demographics were obtained including age, specialty, and post-graduation year (PGY). Participants were asked to complete the Androgen Deficiency in the Aging Male (ADAM) questionnaire and the 36-Item Short Form Health Survey (SF-36) questionnaire, a quality of life assessment tool that addresses functional aspects of life relevant to hypogonadism. Participants were also asked to obtain lab work: basic metabolic panel, complete blood count, Lipid panel, thyroid panel, testosterone, follicle-stimulating hormone, luteinizing-stimulating hormone, and estradiol.

**Results:**

Out of 651 male residents and fellows contacted, 27 trainees expressed interest in participation (response rate 4.1%). Of those participants, 66.7% (18/27) completed surveys. Thirty-three percent (6/18) of these trainees completed labs. Two-thirds (4/6) of those participants had total testosterone levels <400ng/dl, and two participants met serum criteria for hypogonadism. Half (9/18) of participants who completed the questionnaire scored positively in their ADAM responses. 44.4% (8/18) reported their health as worse compared to a year prior (Table 1).

**Conclusions:**

Hypogonadism and symptoms of low testosterone are prevalent in male resident physicians. This is an at-risk population who may benefit from wellness screening.

**Table 1.** ADAM positivity rates and median SF-36 questionnaire results for all study participants including those who obtained labwork with hypogonadal vs. eugonadal results. 100% represents the highest level of function.

| | Hypogonadal (n=2) | Eugonadal (n=4) | All Participants (n=18) |
|---|---|---|---|
| **Positive ADAM** | 100% | 25% | 50% |
| **SF-36** | | | |
| Physical Functioning | 82.5% | 100.0% | 95.0% |
| Role Limitations Due To Physical Health | 62.5% | 100.0% | 100.0% |
| Role Limitations Due To Emotional Problems | 33.3% | 83.4% | 50.0% |
| Energy/Fatigue | 10.0% | 50.0% | 35.0% |
| Emotional Well-Being | 60.0% | 70.0% | 72.0% |
| Social Functioning | 62.5% | 68.8% | 75.0% |
| Pain | 68.8% | 90.0% | 85.0% |
| General Health | 35.0% | 60.0% | 62.5% |
| Health Change | 37.5% | 37.5% | 50.0% |

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**#6**

# THE EFFECT OF TESTOSTERONE THERAPY UPON BONE REMODELLING IN TESTOSTERONE DEFICIENT APOE$^{-/-}$ MICE FED A HIGH FAT DIET

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***Introduction:*** Low testosterone can lead to bone loss in males, but the mechanisms are not fully characterised. This study investigates the effects of testosterone depletion, and subsequent testosterone treatment on parameters of bone remodeling in a murine model of cardiometabolic disease.

***Methods:*** At 8 weeks of age, high-fat diet-fed ApoE-/- mice were randomised into three groups: sham surgery + placebo treatment (control, n=9), orchidectomy + placebo treatment (n =8), and orchidectomy + testosterone treatment (n=10). 25 week old mice were sacrificed and tissues collected for analysis. Left tibiae were decalcified, paraffin embedded and sectioned prior to immunostaining of bone turnover markers including receptor activator of nuclear factor κB ligand (RANKL), Osteoprotegerin (OPG), runx2, Alkaline Phosphatase (ALP), adiponectin and marrow lipid content. Right tibiae underwent mechanical 3-point bend testing at 0.05mm/s using a CellScale Univert.

***Results:*** μCT demonstrated a significant decrease in trabecular bone volume, number, and bone mineral density (BMD) and increased trabecular thickness in orchidectomised mice compared to controls. These parameters returned to control levels in testosterone treated orchiectomised mice. No significant differences were observed in cortical bone. Lipid deposition within the bone marrow was significantly increased in testosterone deficient mice compared to testosterone replete mice. No significant differences in ALP immunopositivity were detected between groups, and runx2 was significantly decreased in orchiectomised mice treated with testosterone compared to controls. The ratio of RANKL/OPG immunopositivity was significantly increased in testosterone deficient mice compared to testosterone replete mice. 3-point bending demonstrated no significant differences in maximal force between groups despite a downward trend in orchiectomised groups compared to controls. Osteoclast number quantified from TRAP-stained sections was not different between groups.

***Discussion:*** Testosterone depletion accelerates trabecular bone loss, mediated by increased osteoclastogenesis via the RANKL/OPG pathway and increased bone marrow adiposity, an effect reversed by testosterone treatment. While this study highlights the benefits of testosterone upon trabecular bone health in male mice these changes may not alter fracture risk as 3-point-bend maximal force was not affected.

#7

# EFFECT OF TESTOSTERONE PELLET THERAPY ON BONE MINERAL DENSITY IN POSTMENOPAUSAL WOMEN

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**Abstract :**The risk of osteoporosis is well-established in postmenopausal women, as is the role of hormone therapy(HT) to decrease the risks of vertebral and non-vertebral fractures. Bone metabolism effects are predominantly mediated by estrogen in men and women either directly, or indirectly through conversion of testosterone(T) via aromatase occurring in bone. HT using estradiol(E2) pellets of 25-50mg, with or without T pellets of 50-75mg, have been shown to improve bone mineral density(BMD). Current trends in hormone pellet therapy include the use of T with minimal or no E2. Lower doses of E2 minimize the occurrence of possible adverse effects such as vaginal bleeding, fibroid enlargement, bloating, and breast tenderness. It is unclear if this trend of T pellet alone or with minimal estrogen has an impact on bone mineral density in postmenopausal women. This study sought to determine the effects of T alone or with little E2 on BMD in postmenopausal women. Patient selection focused on postmenopausal women that had either low bone mass or osteoporosis, and were on average, 20 years post menopause. Bloodwork and serial DXAs were utilized to monitor patient's response to study conditions. All patients had a positive response to therapy either with improvement in BMD or cessation of bone loss. This study demonstrates that testosterone pellet therapy alone or in combination with low-dose estrogen improves BMD in postmenopausal women.

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**#8**

# THE EFFICACY, SAFETY, AND OUTCOMES OF TESTOSTERONE USE AMONG TRANSGENDER MEN PATIENTS

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**Introduction:** Gender dysphoria is the discrepancy between biological sex and gender identity. This can be debilitating for transgender populations, including transgender men (TM), individuals who were assigned female at birth but who identify as men, that can benefit from hormonal therapy with testosterone products to address gender dysphoria.

**Methods:** We aim to summarize the efficacy, safety profile, and outcomes of the different testosterone replacement treatment (TRT) in the TM population. A search of the published literature regarding the various FDA-approved TRT was performed in PubMed, Web of Science and Cochrane Library from 2007 to date.

**Results:** We complied two groups of TRT based on route of administration including the conventional testosterone therapies (intramuscular and subcutaneous injectables, and transdermal gels) and newer testosterone therapies (oral, buccal, and nasal gels). For the conventional testosterone therapies, we identified nine studies discussed conventional TRT in TM population including one randomized trial, four prospective studies, one retrospective study and three reviews. For newer testosterone therapies, we identified three studies discussed newer TRT in TM population including one prospective study and two reviews. Articles were then compiled and analyzed. Albeit majority of TRT data stemming from conventional TRT, there appear to be an overwhelmingly safety and efficacy profile in TM population translated with increased free testosterone levels comparable to male range, menses cessation, anxiety/depression decline and improved quality of life.

**Conclusion:** Testosterone therapy can be impactful for TM population with improved safety, efficiency, quality of life and function. With the rise of the newer FDA-approved TRT, randomized studies are warranted to determine its safety and efficacity in this TM population

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# TESTOSTERONE THERAPY IN MEN WITH CLASSICAL VS FUNCTIONAL HYPOGONADISM: RESULTS FROM A CONTROLLED 9-YEAR, REAL WORLD REGISTRY STUDY

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**Abstract:**

**Background and Significance:** Long-term data on Testosterone therapy (TTh) in hypogonadal men are limited and the clinical value, especially in men with functional hypogonadism is debated. A long-term, real-world registry study comprising groups of patients with hypogonadism of various etiologies provides a suitable and novel approach to this clinical issue.

**Methods:** A registry spanning 9 years comprising 650 patients with hypogonadism included 188 patients with functional hypogonadism (mean age 42.3±11.3 years) and 462 men with classical hypogonadism (266 men had primary hypogonadism [mean age 34.0±11.7 years], 196 had secondary hypogonadism [mean age 31.9±12.0 years]. All men uniformly received intramuscular T undecanoate (1000 mg). Effects of TTh on anthropometric parameters, as well as metabolic and safety parameters were compared.

**Results:** The registry contained 8358 time points with metabolic and safety parameters. Serum T concentrations increased from 5.7±2.3 nmol/L to 19.4±2.8 nmol/L in men with classical hypogonadism and from 7.8±2.4 nmol/L to 19.2±3.1 nmol/L in men with functional hypogonadism (difference of □T between groups: $p<0.0001$). In both categories of hypogonadism, TTh was associated with significant weight loss (WL), decrease in waist circumference (WC) and body mass index (BMI). Changes over time assessed by Cox regression and Kaplan-Meier models revealed differences of inter-individual effects: men with functional hypogonadism were more likely to lose >10% weight and >5% of waist circumference (WC) than men with classical hypogonadism (hazard ratio 1.3 [1.1-1.4], $p=0.008$ and hazard ratio 1.4 [1.3-1.5], $p=0.001$). There was no difference between groups for the overall marked increase in hematocrit. Changes in PSA levels were more likely to occur in functional hypogonadism (hazard ratio 1.3 [1.1-1.6], $p=0.003$). Significantly more pronounced effects during TTh in functional hypogonadism could also be observed in metabolic changes (total cholesterol, triglycerides, LDL- and HDL-cholesterol and fasting glucose). Effects on most parameters, especially hematocrit were significantly modulated by age and baseline values for weight, WC und T.

**Conclusions:** Findings regarding effects and safety of TTh in different groups of hypogonadal men are provided. Effects on factors associated with cardiovascular health are modulated by diagnosis and age. Patients with functional hypogonadism seem to benefit to a larger extent from TTh, most likely attributable to their more pronounced risk factor profile at baseline.