

# The Association Between Guideline-based Exercise Thresholds and low Testosterone Among Men in the United States (PD25-03)

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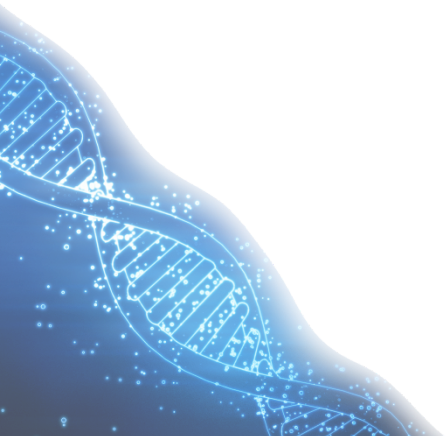
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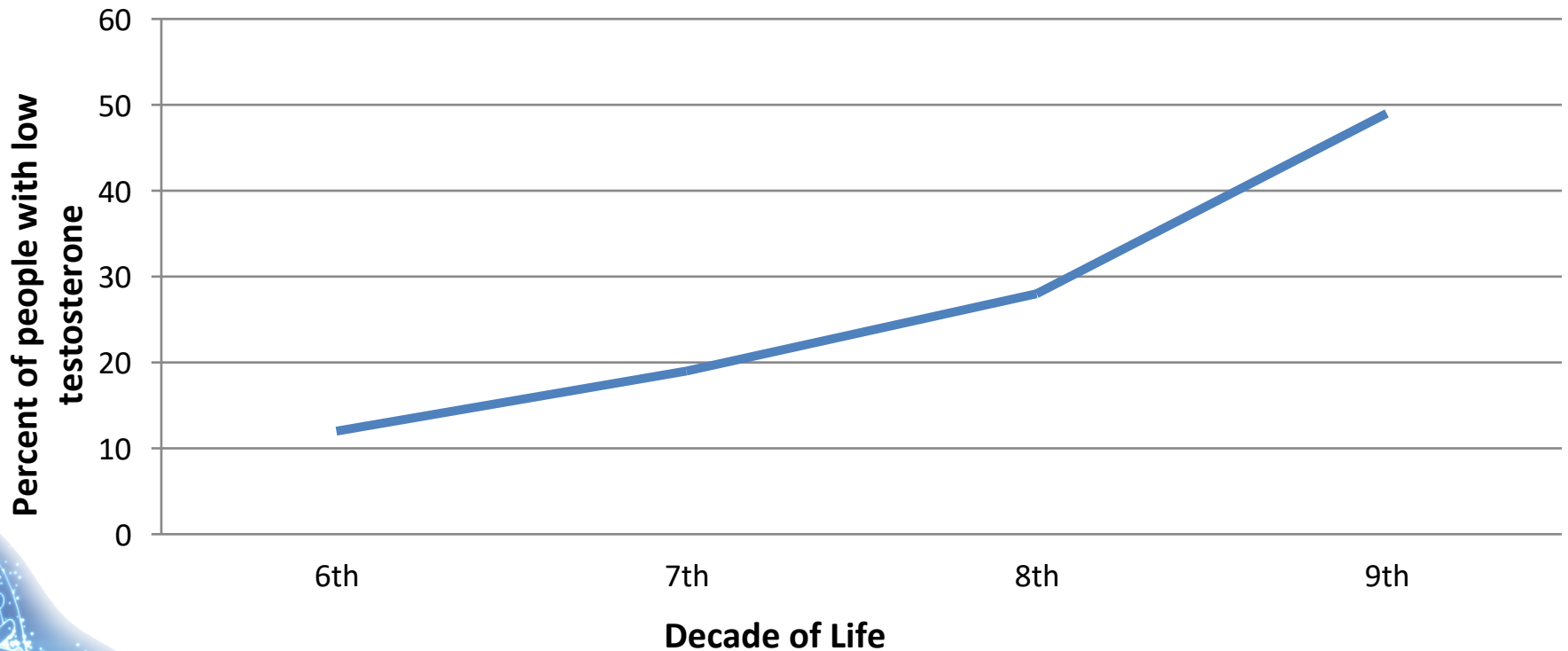
# Disclosures

- None



# Introduction

- Testosterone deficiency (TD) = low testosterone (LT) + symptoms

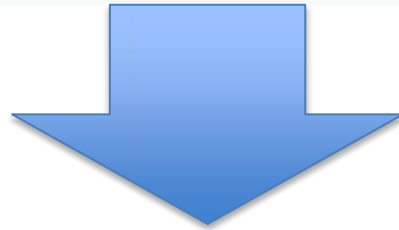


Mulhall et al J Urol 2018  
Harman et al JCEM 2001

# Introduction

## Guideline Statement 21

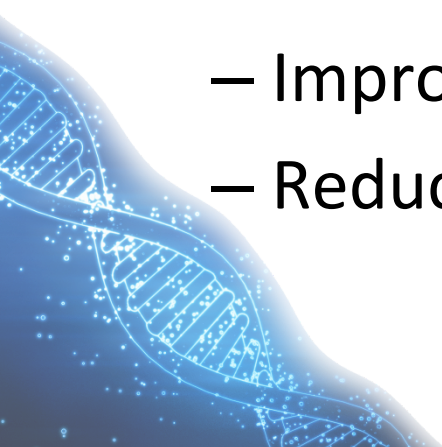
21. All men with testosterone deficiency should be counseled regarding lifestyle modifications as a treatment strategy. (Conditional Recommendation; Evidence Level: Grade B)



- Losing weight or maintaining weight within recommended range + physical activity can reduce signs/symptoms associated with TD
- High BMI w/ LT puts patients at risk for cardiovascular events
- Overweight and obese patients should be counseled regarding weight loss programs

# Introduction

- In 2018, the Physical Activity Guideline Advisory Committee (PAGAC) set a target activity goal 500-1000 MET minutes / week
- Meeting goal is associated with benefits
  - Decreased risk of hypertension, diabetes
  - Improved cognitive function
  - Reduction in falls





# Question / Hypothesis

- Question: Are PAGAC activity thresholds associated with the likelihood of an individual having LT?
- Hypothesis: Men at higher levels of activity levels are less likely to exhibit LT

# Methods

- National Health and Nutrition Examination Survey (NHANES)
  - CDC-sponsored survey to determine health of United States (US)
- Included
  - Data cycles 2011-2016
  - Men age 18-80 with activity questionnaire and serum T level
- Excluded
  - Men with prostate cancer



# Methods

- Activity was categorized as related to work, recreation or transportation
- Activity in each category then divided into vigorous or moderate
- Average MET minutes per week calculated for each participant based on NHANES appendices





# Methods

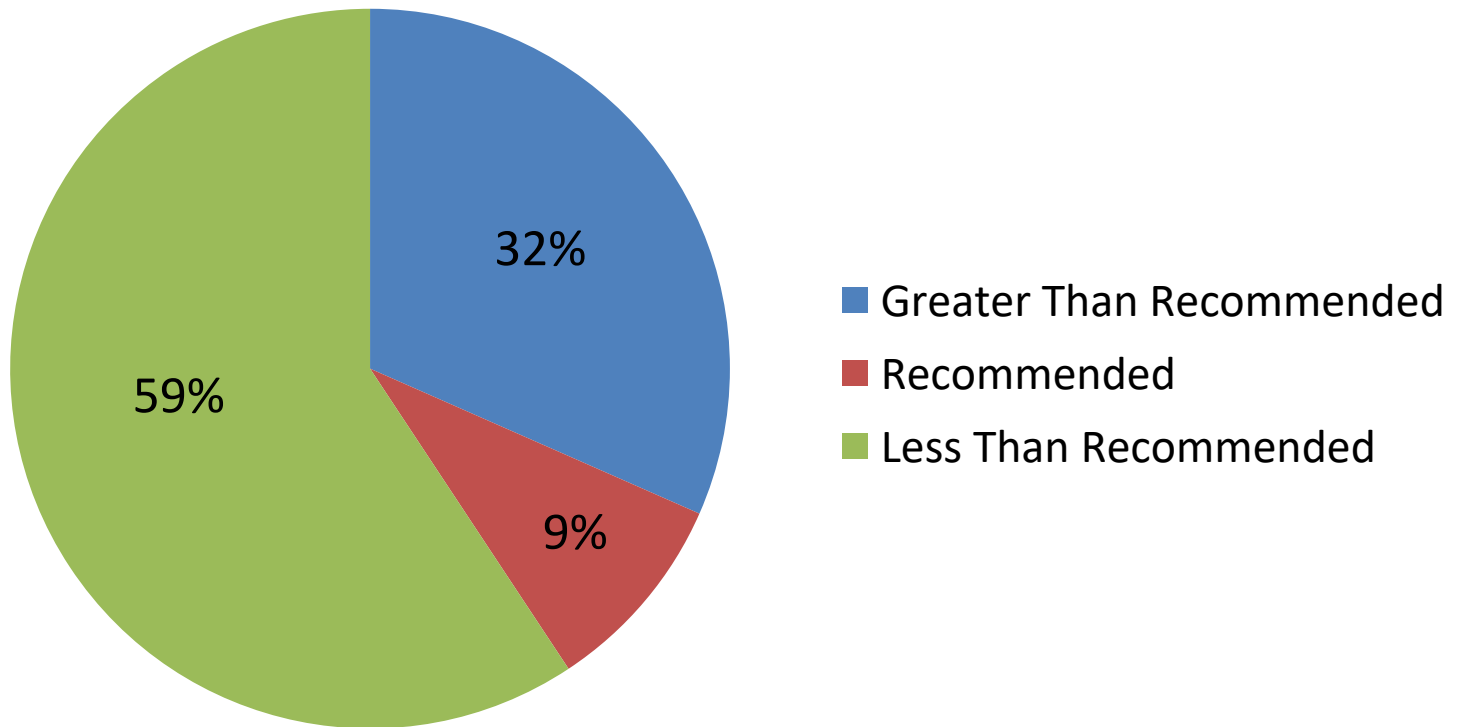
- Activity thresholds determined by PAGAC guidelines

PAGAC Thresholds	MET minutes per Week
< Recommended	<500
Recommended	500-1000
> Recommended	>1000



# Results

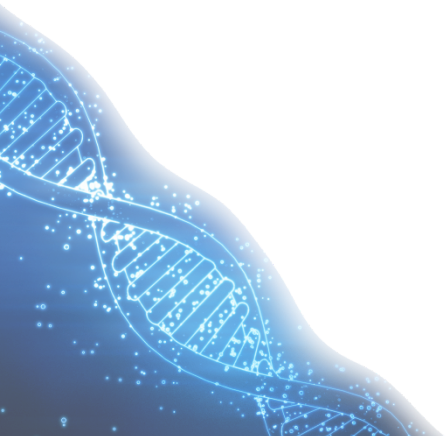
Cohort by PAGAC Activity Level



N=7372

# Results

- Men who did NOT meet 500 MET minutes per week activity threshold were
  - Older
  - Higher BMIs
  - Higher likelihood of comorbidity
  - Higher likelihood of DM



# Results

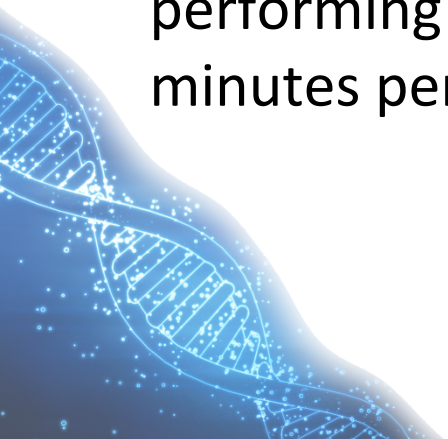
- Average T of cohort = 413.1 ng/dL
- 2100 (28.5%) = LT
- Univariable analysis demonstrated men with LT (compared to those without) were more likely to be
  - Older
  - Obese
  - To have one or more comorbidities
  - **Less physically active**



# Results

- Multivariable models created to determine associations with LT
- Only men who performed >1000 MET minutes per week were less likely to have LT compared to men performing < 500 MET minutes per week

	OR	95% CI	P
Age (years)	1.008	1.001-1.014	<b>0.026</b>
BMI (kg/m <sup>2</sup> )			
Normal (<25) (reference)	-	-	-
Overweight (25-30)	2.168	1.755-2.678	<b>&lt;0.001</b>
Obesity (≥30)	4.97	3.994-6.185	<b>&lt;0.001</b>
Comorbidity Index			
0 (reference)	-	-	-
1	1.047	0.88-1.245	0.598
2	0.884	0.678-1.153	0.356
3	0.867	0.488-1.539	0.62
≥ 4	1.212	0.755-1.947	0.417
Total Physical Activity (MET-minutes/week)			
< Recommended (<500) (reference)	-	-	-
Recommended (500-1000)	0.872	0.599-1.27	0.468
> Recommended (>1000)	0.631	0.549-0.725	<b>&lt;0.001</b>



# Results

To better understand BMI's relationship with Exercise and testosterone we stratified the population into normal, overweight and obese categories by BMI

	BMI < 25			BMI 25-30			BMI ≥ 30		
	OR	95% CI	P	OR	95% CI	P	OR	95% CI	P
<b>Total Physical Activity</b>									
< Recommended (reference)	-	-	-	-	-	-	-	-	-
Recommended	1.064	0.424-2.671	0.893	0.899	0.511-1.582	0.706	0.847	0.452-1.59	0.599
> Recommended	0.754	0.477-1.19	0.219	0.774	0.575-1.044	0.091	0.523	0.409-0.669	<b>0.001&gt;</b>

Using the same covariates (except BMI), the association between activity level and LT only remained statistically significant in the obese group

# Discussion

- Exercise is important for overall health and should be recommended to all individuals
- The effects of exercise on T are intimately related with weight loss
  - AACE suggests 5-10% weight loss can improve T
  - Multiple small trials corroborate this

# Discussion

- We present the largest study analyzing the effects of exercise on LT
- We found an inverse association between exercise levels and LT while controlling for BMI
  - Men at highest exercise level less likely to have LT compared to men at lowest level
  - When stratified according to BMI, this trend persisted **only** in the obese cohort





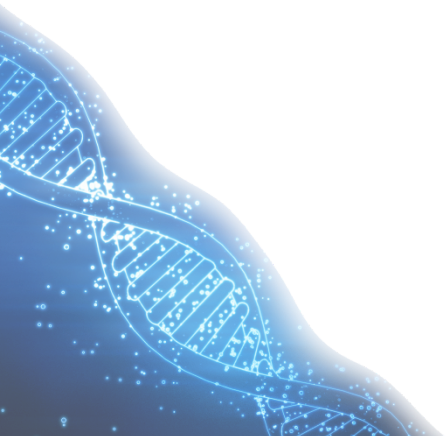
# Limitations

- Cross-sectional study design
- Self-reported activity → recall bias
- Testosterone levels only measured once
- No data on participants' symptoms



# Strengths

- Large nationally generalizable cohort
- NHANES has good data fidelity
- T measured with gold standard tandem MS-LC



# Conclusions

- Exercise is an important lifestyle modification that should be offered to everyone
- When counseling men regarding LT and exercise, our data suggest that there is an inverse association between LT and exercising  $> 1000$  MET minutes per week in the obese population (compared to  $< 500$ )

