Testosterone Use and HIV Serostatus among Men who Have Sex with Men in the MACS

Abstract #914

Sabina A Haberlen[1], Lisa P. Jacobson[1], Frank J Palella Jr.[2], Adrian Dobs[3], Michael Plankey[4], Jordan E. Lake[5], Lawrence A Kingsley[6], Ronald Stall[7], Wendy S Post[1,3], Todd T Brown[3].

1 Department of Epidemiology, Johns Hopkins Bloomberg School of Public Health, 2 Feinberg School of Medicine, Northwestern University, 3 Department of Medicine, Johns Hopkins University, 4 Department of Medicine, Division of Infectious Diseases, Georgetown University Medical Center, 5 Department of Medicine, UCLA David Geffen School of Medicine, 6 Department of Infectious Diseases and Microbiology, Graduate School of Public Health, University of Pittsburgh, 7 Department of Behavioral and Community Health Sciences, Graduate School of Public Health, University of Pittsburgh

Background

- Testosterone therapy (TTh) use has increased markedly in the U.S over the past decade[1] (~3% of men aged 40+ used TTh in the US in 2011[2])
- One study of HIV-infected (HIV+) men reported 12% cumulative prevalence of TTh use among men aged 35+, 1996-2011[3]
- Given the possible cardiovascular risks associated with TTh use and the high burden of cardiovascular disease (CVD) in HIV+ men, data on the prevalence and reasons for TTh use in this population are needed

Aims

- Assess whether TTh use is higher in HIV+ men who have sex with men (MSM) compared to HIV- MSM
- Determine the reasons for, and correlates of, TTh use by HIV serostatus

Methods

- Data on self-reported testosterone use and correlates were collected at semi-annual MACS visits since 2012
- Analytic sample: 2400 (1286 HIV+, 1114 HIV-) men in Baltimore, Chicago, Pittsburgh, and Los Angeles who completed one or more study visits from 2012-2015
- TTh prevalence was calculated by HIV status and age strata using data from each participant's most recent MACS study visit
- Overall prevalence by HIV status was adjusted for age using direct standardization
- Incidence of TTh initiation per 1000 person-years was calculated among TTh-free participants from 2012-2015
- Prevalence ratios (PR) for TTh use estimated using multivariable Poisson regression models with robust variance, by HIV serostatus
- Models adjusted for demographic, lifestyle, and other health related factors, collected within 3 years prior to TTh reporting

Results: TTh Prevalence/Incidence

Table 1: Prevalence of TTh use

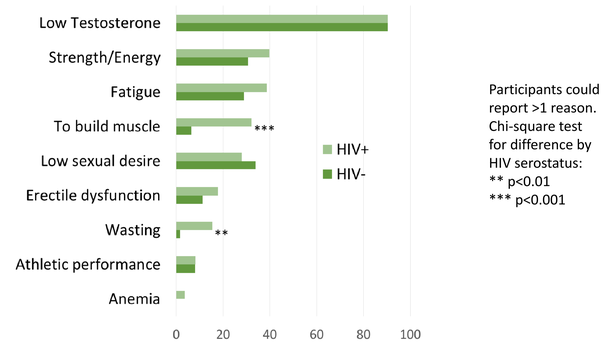
	HIV+		HIV-	
Age	N	TTh Prevalence	N	TTh Prevalence
<50	463	5.6%	210	1.9%
50-59	482	17.2%	356	7.3%
60+	341	25.5%	548	6.2%
Overall*	**1286**	**17.0% (14.9%, 19.2%)**	**1114**	**5.4% (4.1%, 6.7%)**

*Overall prevalence is direct standardized for age, with 95% CI

- TTh use was higher in HIV+ vs HIV- MSM in all age strata
- 99% of men reported receiving a prescription for TTh from a healthcare provider
- 69% of men on TTh used patches or gels; injections were the second most common mode of use (27%)
- 82% of men who reported TTh use during the follow-up period were prevalent users whose date of onset of TTh use was unknown
- The TTh initiation rate in the MACS from 2012-2015 was 17/1000 person years (19.1 HIV+/15.7 HIV-)

Reasons for TTh Use

Figure 1: Self-reported reasons for TTh use, by HIV status



Participants could report >1 reason. Chi-square test for difference by HIV serostatus:
** p<0.01
*** p<0.001

- Among the 260 men (196 HIV+/64 HIV-) on TTh, the major self-reported reason for use was low testosterone levels (90%).
- HIV+ men were more likely than HIV- men to use TTh to build muscle (32% v 7%, p<0.001) and to combat wasting (15% v 2%, p<0.01)

Factors Associated with TTh Use

- After adjustment, TTh use was positively associated with the following covariates: HIV+ serostatus, white race, living in LA or Baltimore (vs. Pittsburgh), older age, having more comorbidities, having 2 or more sexual partners in the last six months (vs. none), and drinking alcohol.
- Men who used TTh were less likely to be classified as pre-frail.
- TTh was associated with lower nadir CD4+ cell count and history of AIDS diagnosis in unadjusted analyses; this association was attenuated in the multivariable model. Future work will investigate associations of TTh use with antiretroviral therapy.

Table 2: Correlates of Testosterone Therapy Use

	HIV-infected				HIV-uninfected						
	TTh		No TTh		TTh		No TTh		Unadjusted	Multivariable	
	n	%	n	%	n	%	n	%	PR	aPR	95% CI
HIV-infected									2.65***	3.90***	[2.79,5.47]
Race											
White	147	75	529	48.5	52	81.3	749	71.3	1 [ref]	1.00	[1.00,1.00]
Hispanic/Other	28	14.3	200	18.3	6	9.4	99	9.4	0.76	1.00	[0.65,1.54]
Black	21	10.7	361	33.1	6	9.4	202	19.2	0.34***	0.46**	[0.28,0.77]
Age (years) med (IQR)	58.1	(53.7, 63.8)	52.7	(44.3, 59.5)	61.5	(55.4, 66.4)	59.8	(52.6, 66.5)	1.34***	1.25*	[1.02,1.54]
Study Site											
Baltimore	43	21.9	278	25.5	13	20.3	264	25.1	1.54*	1.76*	[1.07,2.87]
Chicago	35	17.9	258	23.7	6	9.4	142	13.5	1.53	1.51	[0.89,2.56]
Pittsburgh	26	13.3	274	25.1	11	17.2	297	28.3	1 [ref]	1 [ref]	
Los Angeles	92	46.9	280	25.7	34	53.1	347	33	2.75***	3.40***	[2.20,5.26]
College Degree	119	60.7	440	40.4	43	67.2	633	60.3	1.56***	1.19	[0.88,1.61]
Health Insurance (a)	182	96.3	1016	94.1	48	100	933	94.1	n/a	n/a	
Comorbidity Count (0-5) (b)	2	(2, 3)	2	(1,3)	2	(1,3)	2	(1,2)	1.33***	1.24***	[1.09,1.40]
BMI											
Low (<20.5)	12	6.1	80	7.3	4	6.3	54	5.1	1.18	1.27	[0.75,2.13]
Normal (20.5-24.9)	56	28.6	368	33.8	9	14.1	287	27.3	1 [ref]	1 [ref]	
Overweight (25-29.9)	60	30.6	354	32.5	23	35.9	361	34.4	1.15	1.34	[0.99,1.81]
Obese (>=30)	68	34.7	288	26.4	28	43.8	348	33.1	1.45*	1.17	[0.81,1.68]
Frailty (c)											
No Frailty	83	42.3	419	38.4	30	46.9	412	39.2	1 [ref]	1 [ref]	
Pre-Frail	82	41.8	551	50.6	26	40.6	539	51.3	0.75*	0.73*	[0.54,0.97]
Frailty Phenotype	31	15.8	120	11	8	12.5	99	9.4	1.26	1.06	[0.73,1.54]
AHA/ACC CVD Risk Category (d)											
Low	30	19.6	372	40	6	12.8	216	24.3	1 [ref]	1 [ref]	
Moderate	25	16.3	149	16	9	19.1	141	15.9	1.82**	1.61	[0.96,2.70]
High	98	64.1	410	44	32	68.1	532	59.8	2.10***	1.64	[0.93,2.89]
Erectile Dysfunction Medication in Last 6 Months	18	9.6	93	8.8	6	12.2	77	8	1.29	n/a	
Sexual Partners in Last 6 Months											
None	58	30.9	416	39.4	15	30.6	386	39.8	1 [ref]	1 [ref]	
One	43	22.9	232	22	10	20.4	242	24.9	1.22	1.42	[0.98,2.06]
Two or More	87	46.3	407	38.6	24	49	342	35.3	1.56**	1.83***	[1.35,2.49]
Current Smoker	29	15.1	305	28.6	2	3.5	183	18.6	0.49***	0.65	[0.41,1.01]
Alcohol Use											
None	36	19.4	250	23.7	9	18.4	176	18.2	1 [ref]	1 [ref]	
1-21 Drinks/Week	131	70.4	722	68.6	32	65.3	686	71	1.09	1.44*	[1.01,2.04]
>21 Drinks/Week	19	10.2	81	7.7	8	16.3	104	10.8	1.33	2.09**	[1.29,3.39]

(a) Self-report of any medical coverage public or private since last semiannual MACS visit,
(b) Comorbidity count includes the following diagnoses at the time of the last study visit : 1) depression (CESD>16), 2) high blood pressure (SBP>=140 or DBP>=90 or using antihypertensive medications), 3) diabetes (fasting glucose>=126 or use of diabetes medication), (4) dyslipidemia (fasting total cholesterol>=200mg/dl or LDL>=130mg/dl or HDL<40mg/dl or triglycerides>=150mg/dl or use of lipid-lowering medication), and (5) kidney disease (eGFR<60 or UPRI>=200).
(c) Pre-Frailty includes 1-2 and frailty phenotype includes 3 or more of the 5 components: (1) weakness (grip strength); (2) slowness (timed walk); (3) self-reported unintentional weight loss of 10 pounds or more, (4) self-reported exhaustion, and (5) self-reported limitation in physical activity.
(d) the AHA/ACC pooled cohort equation is based on age, race, systolic blood pressure, hypertension treatment, smoking status, diabetes. Total and high-density lipoprotein cholesterol (HDL) were measured from blood samples.
N=1977 in the multivariable regression model due to missing covariates

Conclusions

- MSM in the MACS reported very high rates of TTh use, particularly older HIV+ men, relative to the general US population
- HIV+ men reported 4 times greater TTh use than HIV- men; however, TTh initiation rates from 2012-2015 were similar by HIV serostatus
- HIV+ men were more likely than HIV- men to use TTh to gain strength, to increase muscle mass and/or to combat wasting
- Large residual differences in TTh use by city after adjustment suggest that factors other than low testosterone (*e.g.*, prescribing patterns) play a significant role in TTh use in the MSM population
- Over 2/3 of men using prescribed TTh (64% of HIV+ men and 68% of HIV- men) were in the AHA/ACC high CVD risk category
- Given the high prevalence of TTh use and CVD risk burden among HIV+ men, the benefits and risks of TTh use should be carefully examined in future studies and closely monitored in clinical practice

References

1) Layton JB, Li D, Meier CR, Sharpless JL, Sturmer T, Jick SS et al. Testosterone lab testing and initiation in the United Kingdom and the United States, 2000 to 2011. J Clin Endocrinol Metab 2014 March;99(3):835-42.
2) Baillargeon J, Urban RJ, Ottenbacher KJ, Pierson KS, Goodwin JS. Trends in androgen prescribing in the United States, 2001 to 2011. JAMA Intern Med 2013 August 12;173(15):1465-6.
3) Bhatia R, Murphy AB, Raper JL, Chamie G, Kitahata MM, Drozd DR et al. Testosterone replacement therapy among HIV-infected men in the CFAR Network of Integrated Clinical Systems. AIDS 2015 January 2;29(1):77-81.

Acknowledgments

We are grateful to the dedicated MACS participants and study staff. We thank Ruibin Wang for her assistance with data management. The MACS is funded by NIH cooperative agreements: U01-AI35042, U01-AI35039, U01-AI35040, U01-AI35041, UM1-AI35043, and UL1-TR001079
The contents of this publication are solely the responsibility of the authors and do not represent the official views of the NIH. For more information, please visit the MACS website: http://aidscohortstudy.org/.