TECHNICAL APPENDIX

Inverse probability of exposure weights for all models were constructed to account for confounding as the product of the inverse probability of each participant's observed alcohol consumption and the inverse probability of his observed number of partners estimated as a function of his history of measured time-dependent predictors. Exposure weights were calculated from a pair of cumulative pooled logistic regression models [1] each accounted for the following time-dependent confounders, lagged one visit: elevated depression symptoms, smoking status, use of illicit drugs and self-reported sexually transmitted infection. In addition, the weight model for partner number also included concurrent alcohol consumption. These weights were stabilized to improve precision by alcohol consumption history (product terms between alcohol consumption at 6, 12, and 18 months prior and restricted cubic splines with knots at the 5^{th}, 27.5^{th}, 50^{th}, 72.5^{th} and 95^{th} percentiles for consumption at those time points), partner history (product terms between partner number at 6, 12 and 18 months prior), and time-fixed covariates measured at baseline [2]. To reduce the potential impact of informative censoring, inverse probability of dropout and death weights were calculated similarly using separate pooled logistic models and those weights were combined with the exposure weights by multiplication. The final stabilized weights had a mean of 1.00 (standard deviation, 0.26) with a range of 0.10-7.56 (Supplementary Figure 1).

This final marginal structural Cox proportional hazards model for HIV seroconversion included as regressors alcohol consumption averaged over the prior year (categorized as none, moderate, or heavy), number of unprotected receptive anal intercourse partners averaged over the prior year (categorized as ≤ 1 or >1), and their product terms. All models also included a

restricted cubic spline representing time since baseline, with knots at the percentiles described above, as well as baseline variables race, ethnicity, college graduation, study site and age (modeled as a restricted cubic spline; described above).

REFERENCES

1. D'Agostino RB, Lee ML, Belanger AJ, Cupples LA, Anderson K, Kannel WB. Relation of pooled logistic regression to time dependent Cox regression analysis: the Framingham Heart Study. Stat Med **1990**; 9:1501-15.

2. Cole SR, Hernán MA. Constructing inverse probability weights for marginal structural models. Am J Epidemiol **2008**; 168:656-64.

Supplementary Tables

Supplementary Table 1. Comparison of alcohol consumption empirical induction periods.

Length of Exposure Window, Years	1		1.5		2	
	HR	95% CL	HR	95% CL	HR	95% CL
Overall						
Nondrinker	1.		1.		1.	
Moderate drinker	1.10	0.78, 1.54	1.06	0.75, 1.49	1.02	0.72, 1.44
Heavy drinker	1.61	1.12, 2.29	1.56	1.08, 2.23	1.44	1.00, 2.08
>1 URAI partner						
Nondrinker	1.		1.		1.	
Moderate drinker	1.19	0.63, 2.24	1.23	0.63, 2.39	1.12	0.60, 2.10
Heavy drinker	1.96	1.03, 3.72	1.90	0.97, 3.70	1.67	0.88, 3.16
0-1 URAI partner						
Nondrinker	1.		1.		1.	
Moderate drinker	1.07	0.72, 1.59	0.99	0.66, 1.49	0.97	0.64, 1.49
Heavy drinker	1.37	0.88, 2.16	1.39	0.89, 2.18	1.30	0.82, 2.07

Abbreviations: CL, confidence limits; HR, hazard ratio; URAI, unprotected receptive anal intercourse.

Supplementary Table 2. Distribution of alcohol consumption and risky sexual behavior by time-on-study over 57,651 follow-up visits by 3,725 men between 1984 and 2007.

		>1 URAI Partner, %			0-1 URAI Partner, %		
Year	n	None	Moderate	Heavy	None	Moderate	Heavy
0	3,725	7.95	15.47	1.97	51.66	7.04	15.92
1	3,210	2.22	5.18	0.81	65.69	10.74	15.38
2	2,934	1.13	2.7	0.23	69.82	11.62	14.49
3	2,725	0.77	1.84	0.21	70.35	12.95	13.88
4	2,530	0.49	1.43	0.31	70.17	12.93	14.67
5	2,177	0.51	0.99	0.3	69.79	13.59	14.83
6	2,032	0.72	1.35	0.24	68.8	15.84	13.06
7	1,965	0.33	1.14	0.28	69.24	15.06	13.95
8	1,903	0.35	1.03	0.15	68.03	16.24	14.2
9	1,836	0.3	0.7	0.33	70.56	15.51	12.61
10	2,235	0.36	1.16	0.04	68.05	17.41	12.98
11	1,494	0.62	1.33	0	66.67	18.66	12.72
12	624	0.89	1.58	0	69.33	16.96	11.24
13	417	0.53	3.48	0.67	65.37	17.38	12.57
14	390	0.14	3.01	1	68.05	15.76	12.03
15	362	0.3	3.35	0.91	67.99	16.16	11.28
16	367	0.45	3.33	0.91	64.75	18.31	12.25
17	439	0	4.76	0.54	68.3	15.92	10.48
18	418	0.82	4.12	1.23	64.06	15.23	14.54
19	378	0.94	3.94	1.57	63.94	16.38	13.23
20	320	0.9	4.32	1.08	67.63	16.37	9.71
21	260	0.64	5.75	0.64	64.89	18.51	9.57
22	200	1.75	5.26	1.17	65.79	13.74	12.28
23	37	0	8.11	0	64.87	13.51	13.51

Abbreviation: URAI, unprotected receptive anal intercourse.

Supplementary Table 3. Characteristics of 529 Multicenter AIDS Cohort Study HIV seroconverters and 3,196 HIV-seronegative participants studied over 57,651 follow-up visits.

Characteristic:	Seroconverter (3,192 visits) n	%	Seronegative (54,459 visits) n	%	Total (57,651 visits) n	%
Median age at baseline, in years (IQR)	30.2 (26.3, 36.4)		33.8 (28.8, 39.7)		33.6 (28.7, 39.5)	
Race/ethnicity						
White non-Hispanic	2,715	85.1	48,304	88.7	51,019	88.5
White Hispanic	249	7.8	4,179	7.5	4,428	7.7
Black	228	7.1	1,976	3.6	2,204	3.8
College graduate	1,804	56.5	35,698	65.6	37,502	65.1
US City						
Baltimore, Maryland	750	23.5	14,934	27.4	15,684	27.2
Chicago, Illinois	708	22.2	10,976	20.2	11,684	20.3
Los Angeles, California	1,052	33.0	14,702	27.0	15,754	27.3
Pittsburgh, Pennsylvania	682	21.4	13,847	25.4	14,529	25.2
Median alcohol consumption[a], in drinks/week	8 (2, 14)		4 (2, 12)		4 (2, 12)	
0	352	11.0	7,638	14.0	7,990	13.9
1-14	2,144	67.2	38,402	70.5	40,546	70.3
>14	696	21.8	8,419	15.5	9,115	15.8
Smoker, current	1,845	57.8	26,466	48.6	28,311	49.1
Depressive symptoms[a]	397	12.4	9,393	17.2	9,790	17.0
Illicit drug use[a,c]	1,990	62.3	25,714	47.2	27,704	48.1
Number of URAI partners[a]:						
0	1,978	62.0	42,761	78.5	44,739	77.6
1	640	20.1	8,939	16.4	9,579	16.6
>1	574	18.0	2,759	5.1	3,333	5.8
Sexually transmitted infections[a,d]	201	6.3	1,533	2.8	1,733	3.0

Abbreviations: IQR, interquartile range; URAI, unprotected receptive anal intercourse.
[a] Prior six months.
[b] Center for Epidemiologic Studies Depression scale (CES-D) >16.
[c] Marijuana/hash, cocaine/crack cocaine or poppers.
[d] Chlamydia or gonorrhea.

Supplementary Table 4. Characteristics of Multicenter AIDS Cohort Study participants stratified by alcohol consumption reported over 57,651 follow-up visits.

	0 drinks/week (7,990 visits)		1-14 drinks/week (40,546 visits)		>14 drinks/week (9,115 visits)	
Characteristic:	n	%	n	%	n	%
Median age at baseline, in years (IQR)	35.6 (30.1, 40.8)		33.4 (28.4, 39.1)		33.9 (28.5, 39.7)	
Race/ethnicity:						
White non-Hispanic	6,783	84.9	35,921	88.6	8,315	91.2
White Hispanic	324	4.1	1,647	4.1	233	2.6
Black	883	11.1	2,978	7.3	567	6.2
College graduate	4,662	58.3	27,407	67.6	5,433	59.6
Smoker, current	4,751	59.5	17,931	44.2	5,629	61.8
Depressive symptoms[a]	1,863	23.3	6,966	17.2	1,637	18.0
Illicit drug use[a,c]	2,094	26.2	21,817	53.8	6,646	72.9
Number of URAI partners[a]:						
0	6,552	82.0	29,932	73.8	6,202	68.0
1	1,012	12.7	7,733	19.1	1,767	19.4
>1	426	5.3	2,881	7.1	1,146	12.6
Sexually transmitted infections[a,d]	203	2.5	1,216	3.0	315	3.5

Abbreviations: IQR, interquartile range; URAI, unprotected receptive anal intercourse.
[a] Prior six months
[b] Center for Epidemiologic Studies Depression Scale (CES-D) >16
[c] Marijuana/hash, cocaine/crack cocaine or poppers
[d] Chlamydia or Gonorrhea

Supplementary Figure 1. Distribution of stabilized weights (mean, 1.00; standard deviation, 0.26) over time and as box plots by study visit year.