

Supplementary Table 1: HPV-31, HPV-33, HPV-35, HPV-45, HPV-52 and HPV-58 antibody level in MFI and seroprevalence among 620 MSM reporting receptive anal sex in the preceding 6 months visiting the STI clinic in Amsterdam, the Netherlands (survey period 2008-2009).

		HPV antibody MFI ^o	<i>P</i> *	HPV seropositive		<i>P</i> **
	n	Median (IQR)		n	%	
HPV-31						
HIV-negative MSM	415	220 (79 – 674)	<0.001	118	28%	<0.001
HIV-positive MSM	205	592 (220 – 1171)		101	49%	
HPV-33						
HIV-negative MSM	415	61 (24 – 191)	<0.001	51	12%	<0.001
HIV-positive MSM	205	183 (68 – 480)		65	32%	
HPV-35						
HIV-negative MSM	415	172 (40 – 620)	<0.001	107	26%	0.011
HIV-positive MSM	205	324 (117 – 880)		73	36%	
HPV-45						
HIV-negative MSM	415	111 (46 – 424)	<0.001	110	27%	<0.001
HIV-positive MSM	205	505 (198 –1065)		119	58%	
HPV-52						
HIV-negative MSM	415	96 (39 – 329)	<0.001	82	20%	<0.001
HIV-positive MSM	205	279 (100 – 713)		83	40%	
HPV-58						
HIV-negative MSM	415	63 (27 – 181)	<0.001	59	14%	0.123
HIV-positive MSM	205	146 (62 – 341)		39	19%	

^o HPV antibody level in median fluorescence intensity (MFI)

‡ Serology cut-off was set to 400 MFI for HPV-33, HPV-45, HPV-52 and HPV-58 and to 600 MFI for HPV-31 and HPV-35

* *p*-values based on Kruskal-Wallis test

** *p*-values based on Chi-Squared test

Abbreviations: HPV: Human papillomavirus, IQR: Interquartile range, MSM: Men who have sex with men.

Supplementary Table 2: Association between HIV status and HPV-31, HPV-33, HPV-35, HPV-45, HPV-52 and HPV-58 seropositivity in MSM reporting receptive anal sex in the preceding 6 months visiting the STI clinic in Amsterdam, the Netherlands (survey period 2008-2009)

	Bivariable analysis		Multivariable analysis	
	OR	95% CI	aOR	95% CI
HPV-31				
HIV-negative MSM	1		1	
HIV-positive MSM	2.44	(1.73 - 3.46)	1.86	(1.16 - 2.98)
HPV-33				
HIV-negative MSM	1		1	
HIV-positive MSM	3.31	(2.19 - 5.02)	2.84	(1.60 - 5.01)
HPV-35				
HIV-negative MSM	1		1	
HIV-positive MSM	1.59	(1.11 - 2.28)	1.44	(0.88 - 2.37)
HPV-45				
HIV-negative MSM	1		1	
HIV-positive MSM	3.84	(2.70 - 5.46)	2.39	(1.49 - 3.82)
HPV-52				
HIV-negative MSM	1		1	
HIV-positive MSM	2.76	(1.91 - 4.00)	2.21	(1.33 - 3.65)
HPV-58				
HIV-negative MSM	1		1	
HIV-positive MSM	1.42	(0.91 - 2.21)	1.20	(0.64 - 2.22)

Abbreviations: HPV: Human papillomavirus, OR: Odds ratio, aOR: Adjusted odds ratio, CI: Confidence interval, MSM: men who have sex with men,

All multivariable models were adjusted for: (i) age in years (categorical), (ii) age of sexual debut (categorical), (iii) number of lifetime sexual partners (categorical), (iv) number of casual partners in the preceding six months (categorical), (v) condom use during receptive anal sex in the preceding six months, (vi) unprotected receptive anal fisting in the preceding six months, (vii) condom use behavior during sex with an HIV positive partner(s) in the preceding six months, and (viii) STI diagnosed at visit (gonorrhea, Chlamydia or syphilis)

Supplementary table 3: Determinants of HPV-16 and HPV-18 seropositivity in 620 MSM reporting receptive anal sex in the preceding 6 months, visiting the STI clinic in Amsterdam, the Netherlands (survey period 2008-2009): bivariable analyses

Supplementary table 3a: Determinants of HPV-16 and HPV-18 seropositivity in 415 HIV-negative MSM reporting receptive anal sex in the preceding 6 months, visiting the STI clinic in Amsterdam, the Netherlands (survey period 2008-2009)

	HPV-16 seropositivity			Bivariable analysis		<i>p</i> *	HPV-18 seropositivity			Bivariable analysis		<i>p</i> *
	n	total	%	OR	95% CI		n	total	%	OR	95% CI	
(i) Demographic characteristics												
Age in years												
≤31	38	137	28%	1		0.050	26	137	19%	1		0.012
32-39	37	118	31%	1.19	(0.69 - 2.04)		37	118	31%	1.95	(1.09 - 3.47)	
40-44	20	80	25%	0.87	(0.46 - 1.63)		21	80	26%	1.52	(0.79 - 2.93)	
≥45	35	80	44%	2.03	(1.14 - 3.61)		31	80	39%	2.70	(1.45 - 5.02)	
Ethnicity ***												
Dutch	70	244	29%	1		0.123	64	244	26%	1		0.099
Surinamese, Dutch Antillean, or Aruban	8	15	53%	2.84	(0.99 - 8.13)		8	15	53%	3.21	(1.12 - 9.22)	
Other	52	156	33%	1.24	(0.81 - 1.92)		43	156	28%	1.07	(0.68 - 1.68)	
Education												
Low	35	94	37%	1		0.158	29	94	31%	1		0.427
High	94	319	29%	0.70	(0.43 - 1.14)		85	319	27%	0.81	(0.49 - 1.35)	
(ii) Sexual behavior												
Age of sexual debut in years												
≤15	35	122	29%	1		0.551	34	122	28%	1		0.902
16-17	38	123	31%	1.11	(0.64 - 1.92)		33	123	27%	0.95	(0.54 - 1.66)	
18-19	24	82	29%	1.03	(0.56 - 1.91)		21	82	26%	0.89	(0.47 - 1.68)	
≥20	32	85	38%	1.50	(0.83 - 2.70)		26	85	31%	1.14	(0.62 - 2.09)	

Lifetime number of sexual partners

≤40	35	138	25%	1		0.079	32	138	23%	1		0.500
41-100	46	119	39%	1.85	(1.09 - 3.16)		34	119	29%	1.33	(0.76 - 2.32)	
101-304	24	89	27%	1.09	(0.59 - 1.99)		28	89	31%	1.52	(0.84 - 2.76)	
≥305	25	69	36%	1.67	(0.90 - 3.12)		21	69	30%	1.45	(0.76 - 2.77)	

Number of casual partners in the preceding six months

≤3	49	161	30%	1		0.906	39	161	24%	1		0.580
4-6	25	84	30%	0.97	(0.54 - 1.72)		24	84	29%	1.25	(0.69 - 2.27)	
7-19	31	90	34%	1.2	(0.69 - 2.08)		29	90	32%	1.49	(0.84 - 2.63)	
≥20	25	80	31%	1.04	(0.58 - 1.86)		23	80	29%	1.26	(0.69 - 2.31)	

Condom use during receptive anal sex in the preceding 6 months

Always a condom	70	216	32%	1		0.009	64	216	30%	1		0.116
Not always a condom	53	149	36%	1.15	(0.74 - 1.79)		43	149	29%	0.96	(0.61 - 1.52)	
Never a condom	7	50	14%	0.34	(0.15 - 0.79)		8	50	16%	0.45	(0.20 - 1.02)	

Unprotected receptive anal fisting in the preceding six months

No	12	386	31%	1		0.924	10	386	26%	1		0.026
Yes	8	25	32%	1.04	(0.44 - 2.48)		12	25	48%	2.57	(1.14 - 5.82)	

Condom use during sex with an HIV positive partner(s) in the preceding six months

No sex with an HIV positive partner	46	170	27%	1		0.248	38	170	22%	1		0.177
Always a condom	38	121	31%	1.23	(0.74 - 2.06)		40	121	33%	1.72	(1.02 - 2.89)	
Not always/Never a condom	20	48	42%	1.93	(0.99 - 3.75)		16	48	33%	1.74	(0.86 - 3.50)	
Don't know	26	75	35%	1.43	(0.80 - 2.56)		21	75	28%	1.35	(0.73 - 2.51)	

(iii) Sexually transmitted infection**Diagnosed with any STI at visit****

No	92	313	29%	1		0.141	81	313	26%	1		0.149
Yes	38	102	37 %	1.43	(0.89 - 2.28)		34	102	33%	1.43	(0.88 - 2.32)	

Supplementary table 3b: Determinants of HPV-16 and HPV-18 seropositivity in 205 HIV-positive MSM reporting receptive anal sex in the preceding 6 months, who visited the STI clinic in Amsterdam, the Netherlands (survey period 2008-2009)

	HPV-16 seropositivity			Bivariable analysis		P*	HPV-18 seropositivity			Bivariable analysis		P*
	n	total	%	OR	95% CI		n	total	%	OR	95% CI	
(i) Demographic characteristics												
Age in years												
≤31	16	26	62%	1		0.912	12	26	46%	1		0.834
32-39	37	54	69%	1.36	(0.51 - 3.61)		30	54	56%	1.46	(0.57 - 3.73)	
40-44	34	54	63%	1.06	(0.41 - 2.79)		26	54	48%	1.08	(0.42 - 2.77)	
≥45	46	71	65%	1.15	(0.45 - 2.91)		36	71	51%	1.20	(0.49 - 2.95)	
Ethnicity ***												
Dutch	76	120	63%	1		0.599	61	120	51%	1		0.472
Surinamese, Dutch Antillean, or Aruban	8	14	57%	0.77	(0.25 - 2.37)		5	14	36%	0.54	(0.17 - 1.70)	
Other	49	71	69%	1.29	(0.69 - 2.41)		38	71	54%	1.11	(0.62 - 2.00)	
Education												
Low	35	59	59%	1		0.308	27	59	46%	1		0.389
High	97	145	67%	1.39	(0.74 - 2.59)		76	145	52%	1.31	(0.71 - 2.40)	
(ii) Sexual behavior												
Age of sexual debut in years												
≤15	51	83	61%	1		0.738	44	83	53%	1		0.627
16-17	34	49	69%	1.42	(0.67 - 3.01)		26	49	53%	1.00	(0.49 - 2.03)	
18-19	24	39	62%	1.00	(0.46 - 2.19)		16	39	41%	0.62	(0.29 - 1.33)	
≥20	22	32	69%	1.38	(0.58 - 3.29)		16	32	50%	0.89	(0.39 - 2.00)	
Lifetime number of sexual partners												
≤40	11	21	52%	1		0.335	8	21	38%	1		0.463

41-100	37	51	73%	2.40	(0.84 - 6.90)		24	51	47%	1.44	(0.51 - 4.08)	
101-304	28	47	60%	1.34	(0.48 - 3.77)		27	47	57%	2.19	(0.76 - 6.29)	
≥305	57	86	66%	1.79	(0.68 - 4.69)		45	86	52%	1.78	(0.67 - 4.74)	
Number of casual partners in the preceding six months												
≤3	21	42	50%			0.906	18	42	43%	1		0.691
4-6	26	36	72%	0.97	(0.54 - 1.72)		20	36	56%	1.67	(0.68 - 4.09)	
7-19	40	58	69%	1.2	(0.69 - 2.08)		30	58	52%	1.43	(0.64 - 3.18)	
≥20	46	69	67%	1.04	(0.58 - 1.86)		36	69	52%	1.45	(0.67 - 3.15)	
Condom use during receptive anal sex in the preceding 6 months												
Always a condom	26	46	57%	1		0.174	18	46	39%	1		0.168
Not always a condom	86	132	65%	1.44	(0.73 - 2.85)		70	132	53%	1.76	(0.89 - 3.48)	
Never a condom	21	27	78%	2.69	(0.92 - 7.92)		16	27	59%	2.26	(0.86 - 5.97)	
Unprotected receptive anal fisting in the preceding six months												
No	100	156	64%	1		0.890	82	156	53%	1		0.278
Yes	30	46	65%	1.05	(0.53 - 2.09)		20	46	43%	0.69	(0.36 - 1.35)	
Condom use during sex with an HIV positive partner(s) in the preceding six months												
No sex with an HIV positive partner	4	14	29%	1		0.038	4	14	29%	1		0.262
Always a condom	21	30	70%	5.83	(1.44 - 23.61)		13	30	43%	1.91	(0.49 - 7.49)	
Not always/Never a condom	100	149	67%	5.10	(1.52 - 17.09)		80	149	54%	2.90	(0.87 - 9.66)	
Don't know	6	10	60%	3.75	(0.67 - 20.86)		5	10	50%	2.50	(0.46 - 13.65)	
Diagnosed with any STI at visit**												
No	81	136	60%	1		0.023	63	136	46%	1		0.076
Yes	52	69	75%	2.08	(1.09 - 3.96)		41	69	59%	1.70	(0.94 - 3.05)	

Abbreviations: HPV: Human papillomavirus, MSM: Men who have sex with men, OR: Odds ratio, CI: Confidence interval, STI: Sexually transmitted infection

Note:

* p -values are based on likelihood-ratio test

**Any STI: gonorrhea, Chlamydia or syphilis

*** Ethnicity was defined on the basis of maternal and paternal country of birth