

Oral HPV Infection, Oral Sex, Oropharyngeal Cancer, and the Effect of HIV: What You Need to Know

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Disclosures

- None

Objectives

To understand

- Risk factors for oral HPV infection
- Why oral HPV prevalence and HPV-OPC risk is higher in men than women
- Effect of HIV on oral HPV

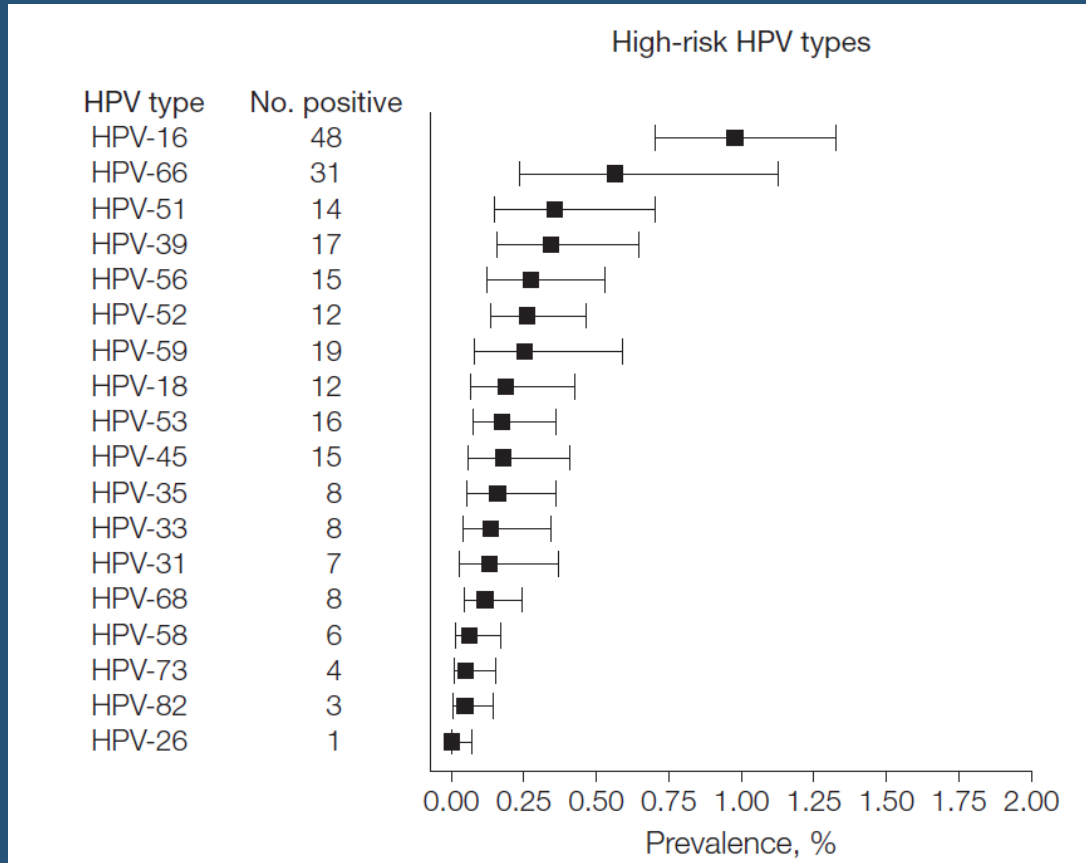
Oral HPV Infection and Oral Sex



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Oncogenic oral HPV prevalence, (HPV DNA tested in oral rinse) NHANES



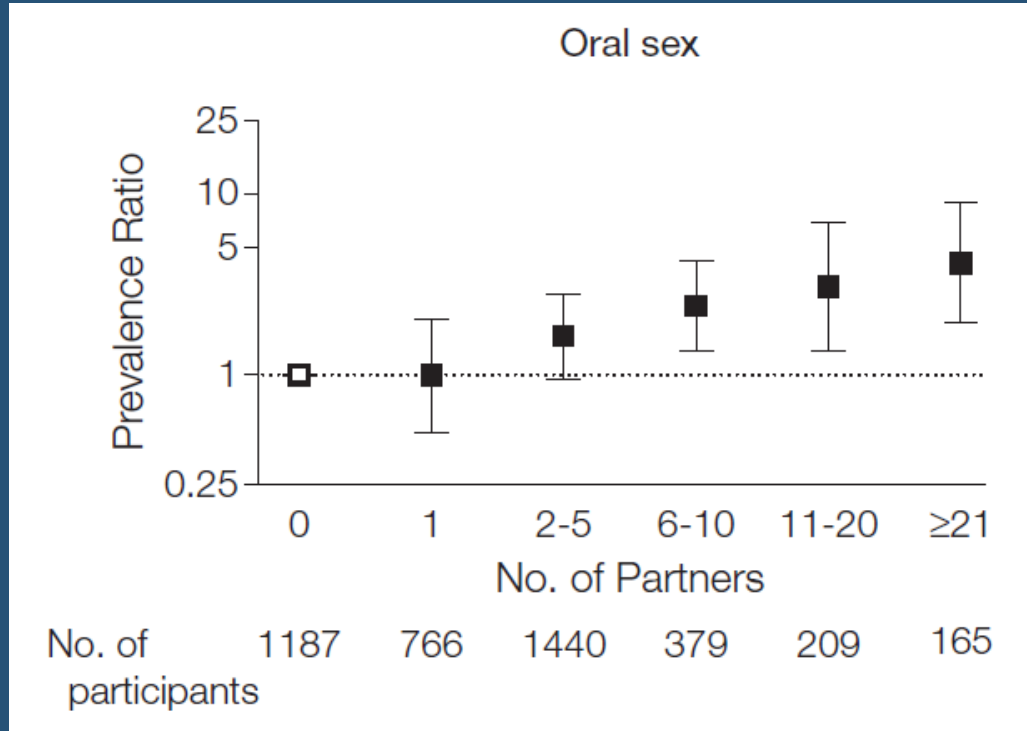
**In general U.S.
population**

- **Prevalent oral HPV16**
 - **1%**
- **Any oral HPV**
 - **10.1% men**
 - **3.6% women**

Gillison, Chaturvedi. JAMA 2012

Oral HPV Prevalence

lifetime ORAL sexual partners



lifetime oral sex partners

0 – 3% prev

1 – 3%

2-5 – 6%

6-10 – 10%

11-20 – 15%

21+ – 22%

Gillison, Chaturvedi. JAMA 2012

Oral HPV Prevalence

Effect of sex

Oral HPV DNA prevalence	20-29 (young adult)	30-44 (adult)	45-59 (middle age)	60-69 (senior)
Any Oral HPV				
Men	8.2%	10.4%	13.5%	13.5%
Women	4.0%	2.3%	3.7%	3.5%
Oral HPV16				
Men	1.5%	1.8%	2.3%	2.1%
Women	0.2%	0.1%	0.5%	0.5%

Oral HPV16 is 6 times more common among men than women

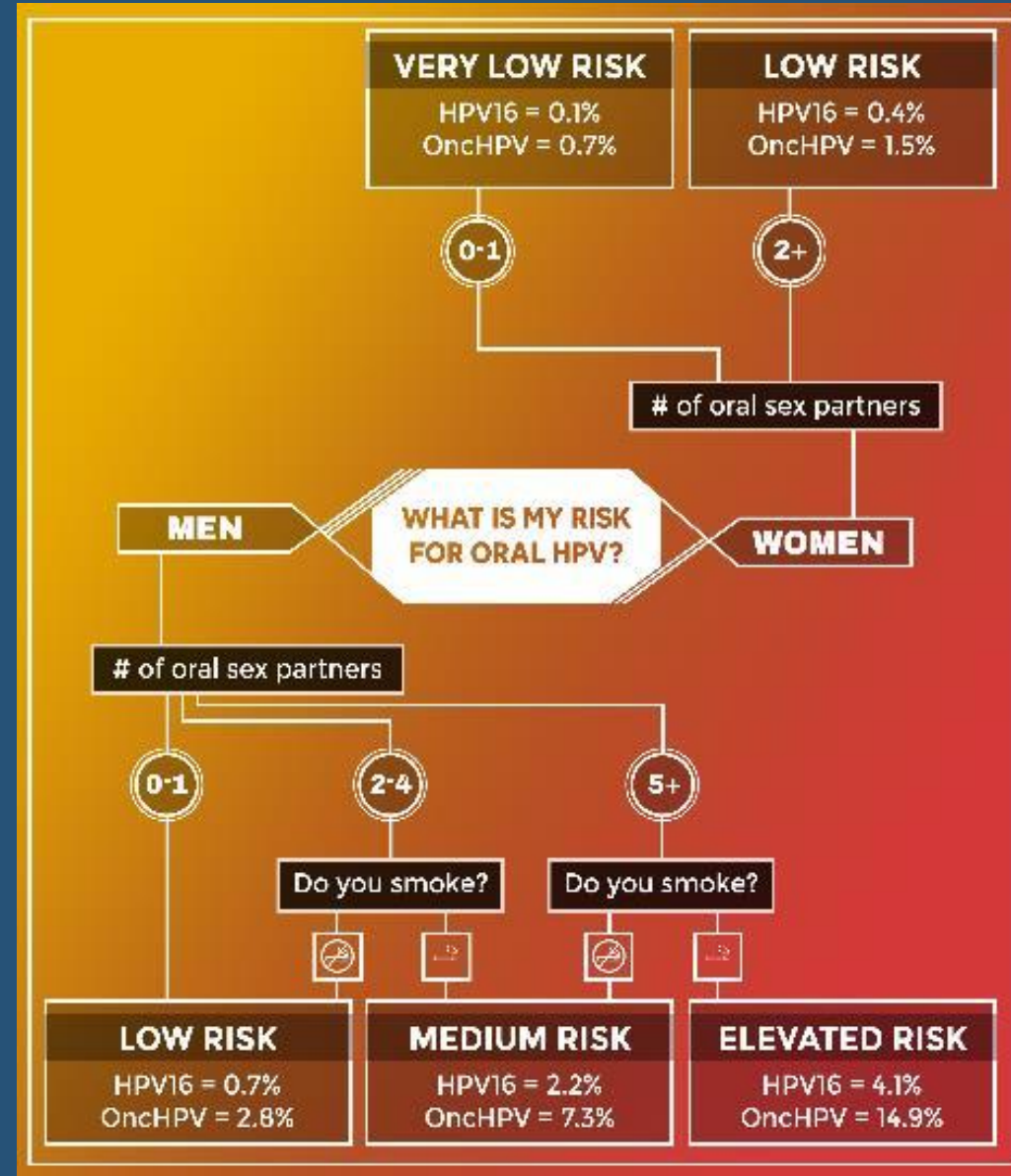
- ***NOT explained by differences in oral sex***

D'Souza et al. PLOS One, 2014, 9(1): e86023. (NHANES)

What is my risk for oral HPV?

Oral HPV prevalence
in U.S. general population

Stratifies into risk groups
by sexual behavior,
tobacco, & sex



Oral HPV Incidence

Group	Sex	Incidence Rate Per 1,000 person-months	Cum Inc in one year
Adult (HIM cohort)	Men	6 / 1,000 pm	7%
18-24 yrs Univ Students	Men	10 / 1,000 pm	12%
18-25 yrs STD Clinic	Men	20 / 1,000 pm	24%
18-25 yrs STD Clinic	Women	13 / 1,000 pm	16%
Compare to CERVIX, general population⁵			~20%

Many people are likely exposed to oral HPV infection in their lives

- Oral HPV incidence ~7-15% /year
- Likely >50% of men & women exposed to some oral HPV in their lives

Kreimer et al. *Lancet* 2013; 382(9895):877-87; D'Souza et al. *J Infect Dis.* 2016; 213(12):1893-6; Edelestein et al. *Sex Trans Dis.* 2012; 39: 860-7.

Oral HPV16 Incidence

Group	Sex	Incidence Rate Per 1,000 person-months	Cum Inc in one year
Adult (HIM cohort)	Men	0.8/ 1,000 pm	1.0%
18-24 yrs Univ Students	Men	0.7 / 1,000 pm	0.8%
High-risk 18-25 yrs	Men	2.5 / 1,000 pm	3.0%
High-Risk 18-25 yrs	Women	0.7/ 1,000 pm	0.8%

Lifetime risk of oral HPV16 infection

- ~6-30% of men
- ~2-10% of women

D'Souza et al. *J Infect Dis*. 2016 Feb 10

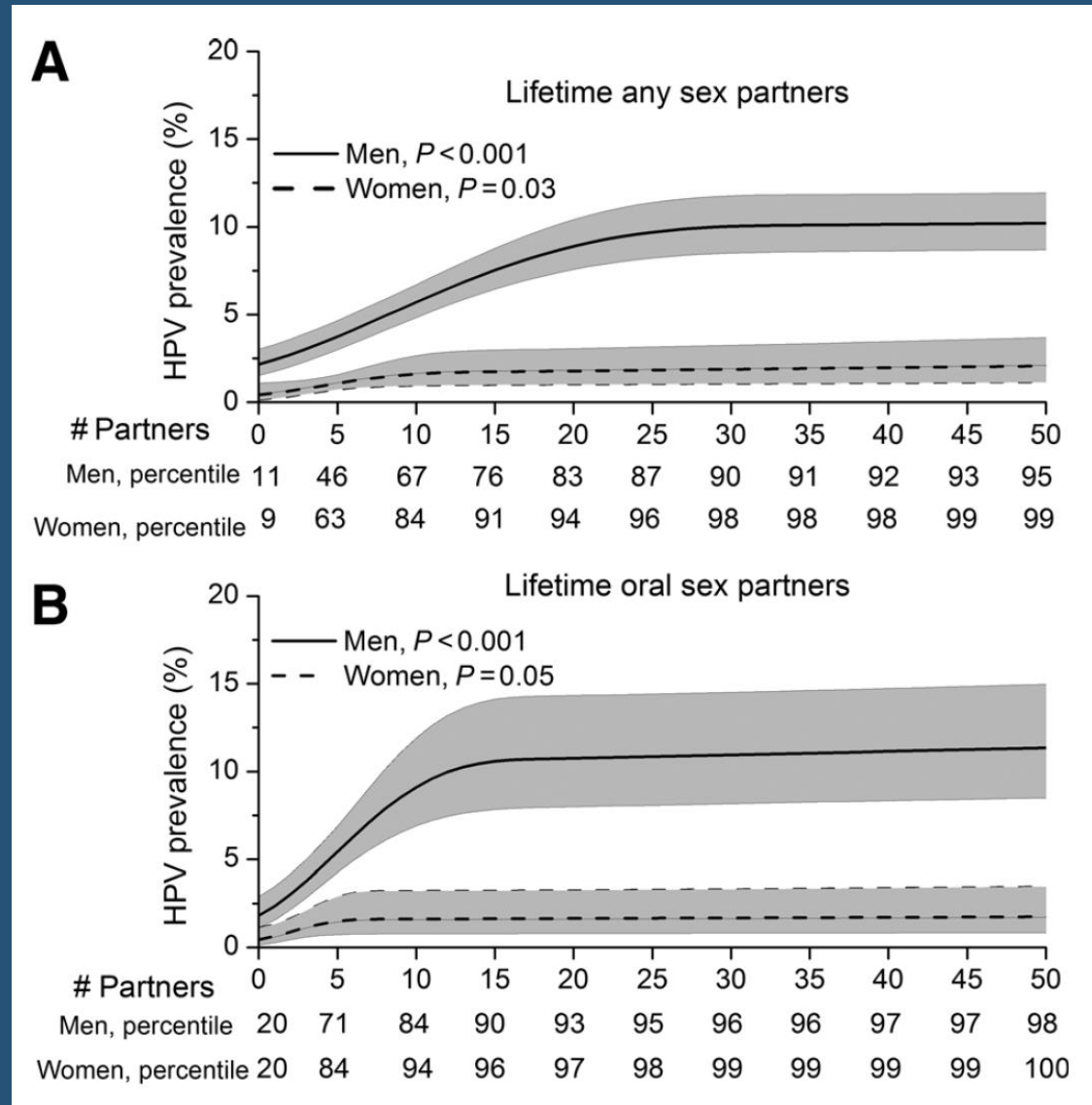
Kreimer et al. *Lancet* 2013; 382(9895):877-87.

Per Partner Risk of Oral HPV in men and women

With same number of lifetime sexual partners – men have higher oral HPV prevalence.

Chaturvedi et al. Cancer Res. 2015 Jun 15;75(12):2468-77.

D'Souza, Cullen Fakhry. PLOS One, 2014, 9(1): e86023.

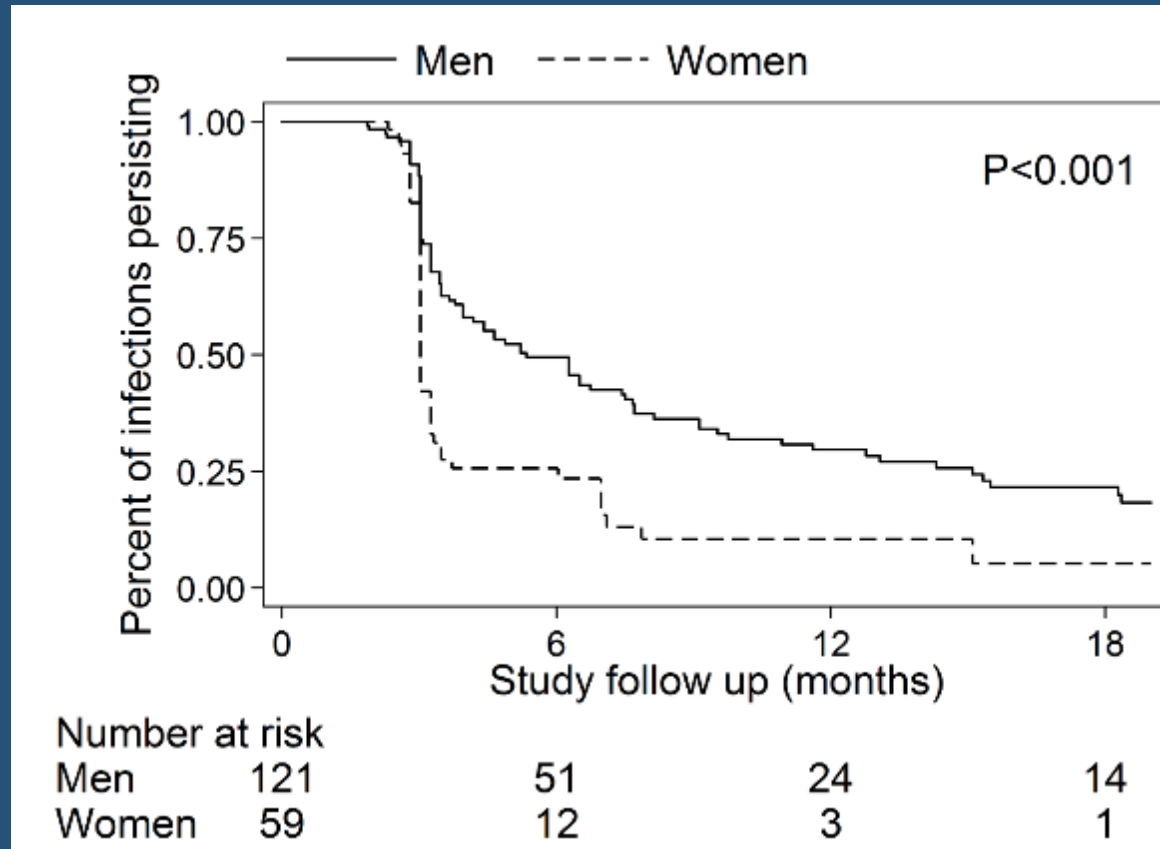


Risk Factors for incident oral HPV may differ for men and women

	Men	Women
Any recent oral sex	3.15 (1.4-7.0)	0.66 (0.27-1.6)
# recent oral sex partners: 0	1.00	1.00
1	3.02 (1.3-6.8)	0.56 (0.22-1.4)
2	3.07 (1.1-8.9)	1.13 (0.39-3.2)
≥ 3	4.54 (1.4-14.8)	0.95 (0.19-4.8)
P-trend	0.001	0.86
Recent cunnilingus (oral sex on a woman)	2.52 (1.3-5.0)	0.77 (0.31-1.9)
Recent fellatio (oral sex on a man)	0.85 (0.29-2.5)	0.43 (0.17-1.1)

D'Souza et al. *J Infect Dis.* 2016 Feb

Oral HPV clearance by sex: SPITT study (18-25 year olds)



D'Souza et al. *J Infect Dis.* 2016 Feb 10

Summary

- Oral HPV incidence lower than genital HPV
- Most infections clear within 1-2 years, but not all
- Men have
 - higher oral HPV acquisition
 - lower oral HPV clearance
 - Not fully explained by # oral sex partners

Oropharyngeal Cancer



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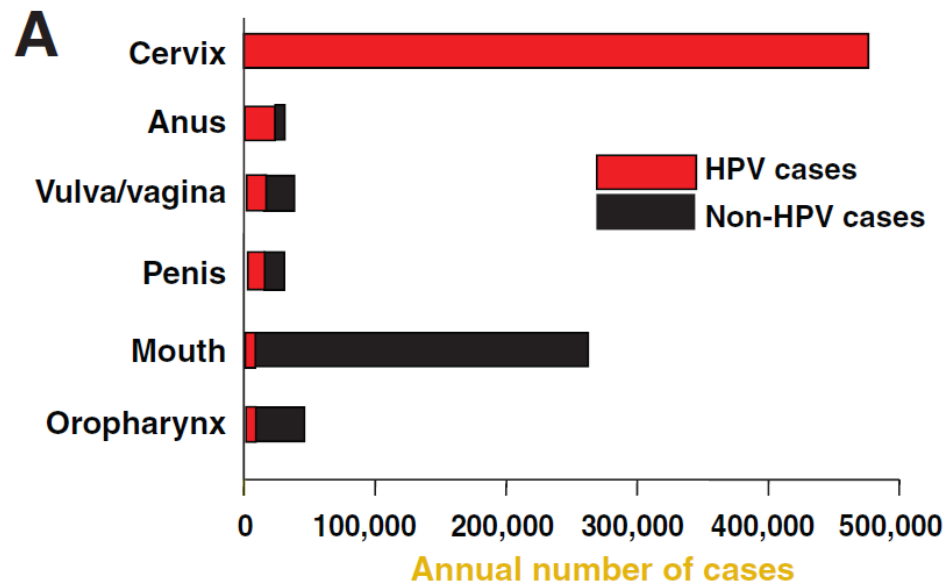
Who is at increased risk of HPV+OPC?

1. **Men**
2. **Risk increases with age**
3. **HIV-infected ¹**
4. **Husbands of women with cervical cancer²**
 - ~3-fold increased risk of tonsillar cancer
 - Unclear in spouse of HPV+ OPSCC at increased risk ³
5. **Individuals with hx of anogenital SCC⁴**
 - 4-6 fold increase risk of tonsillar cancer

¹Chaturvedi A JNCI 2010; ²Hemminki K Eur J Cancer Prevention 2001; ³Andrews E J Infect Dis 2009; ⁴ Frisch M Lancet 1999

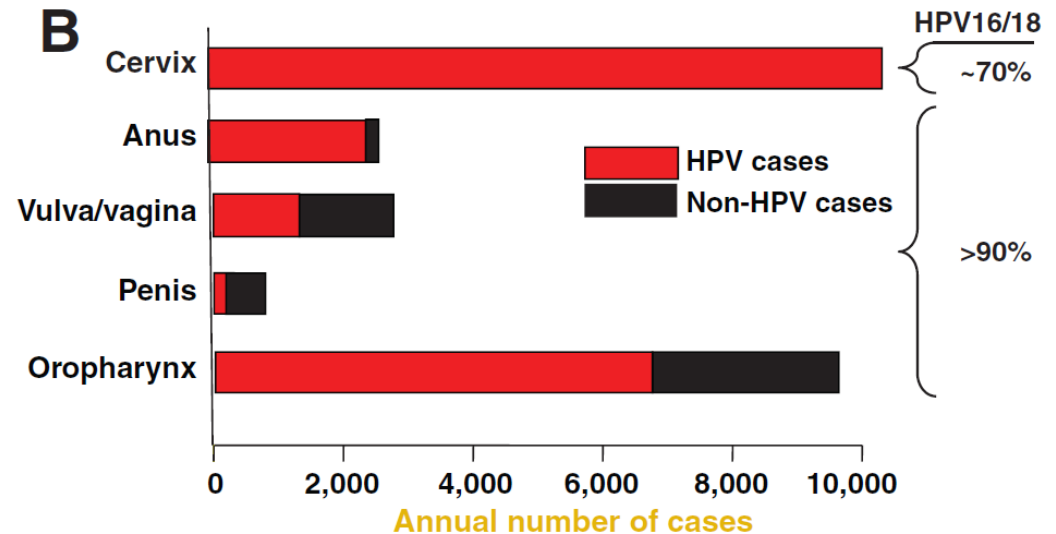
HPV-associated diseases

Worldwide Incidence of HPV-associated cancers



**Most US OPC now
caused by HPV
7-8,000 cases/ year in US**

U.S. Incidence of HPV-associated cancers



Are disparities in HPV-OPC explained by differences in behavior?

	NHANES DATA FROM 2009–2010			SEER DATA FROM 2009
	Sexual behavior			
	Ever performed oral sex	5 lifetime oral sex partners*	Oral HPV16 Infection	Age adjusted OSCC incidence/100,000
Gender				
Male	85.4%	32.4%	1.95%	9.1
Female	83.2%	17.6%	0.29%	1.9
Ratio** (M/F)	1.03 (1.01, 1.05)	1.84 (1.54, 2.20)	6.79 (2.07, 22.26)	4.71 (4.42, 5.02)

D'Souza G et al(2014) PLoS ONE 9(1): e86023.

Risk of developing OPC, by sex

	Risk Spectrum: Infection to Cancer	
	NHANES: Prevalence	SEER: OPC cases/100 people
Sex	Oncogenic Oral HPV	Lifetime
Men	6.0%	0.7%
Women	1.1%	0.2%

**Higher oral HPV prevalence in men than women
→ higher OPC incidence in men**

DSouza, McNeel, Fahkry. Annals of Oncology. 2017 Publication pending

Risk of developing OPC in next 20 years, by sex & age

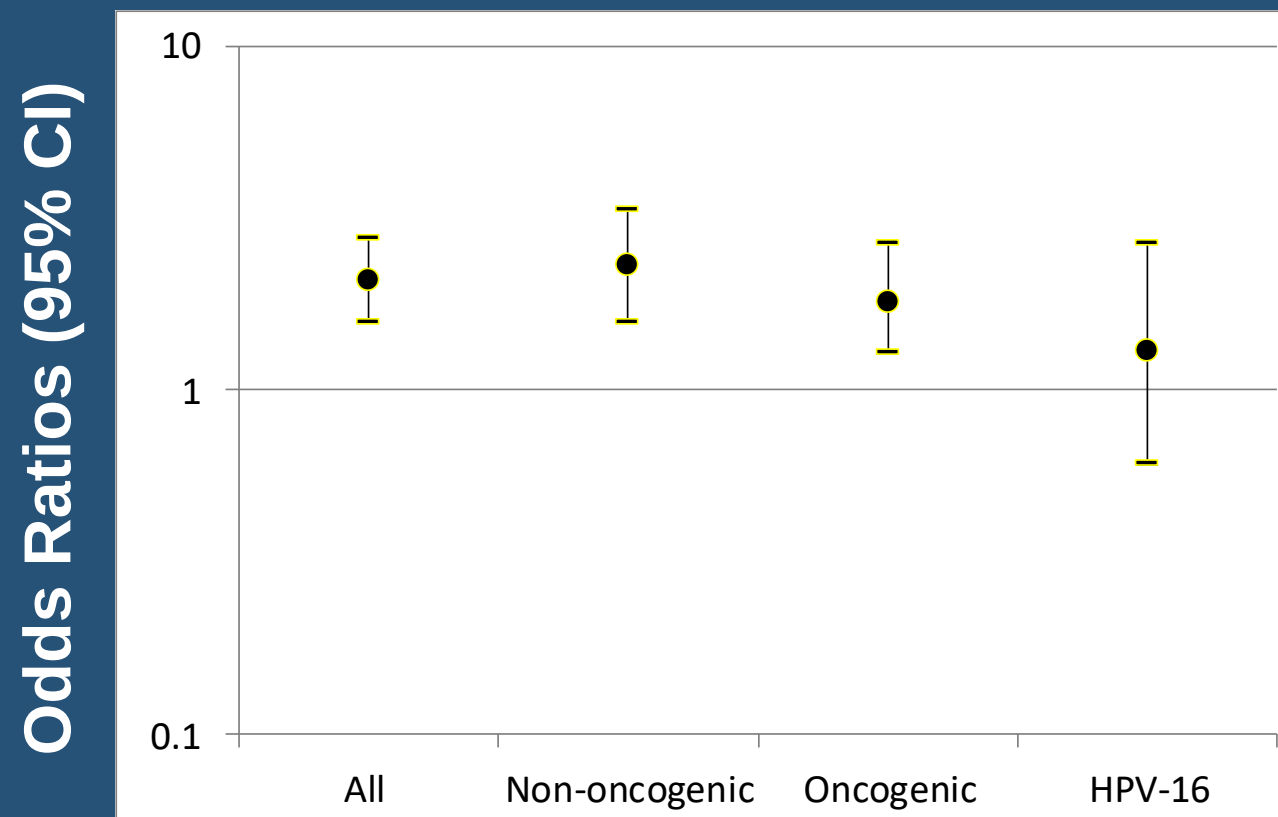
	20 yr OPC risk: Cases/100 people	
Age	Men	Women
20-29	0.01%	<0.01%
30-39	0.07%	0.01%
40-49	0.3%	0.05%
50-59	0.4%	0.08%
60-69	0.4%	0.10%

OPC risk remains low in every age group

DSouza, McNeel, Fahkry. Annals of Oncology. 2017

Effect of HIV on oral HPV and OPC

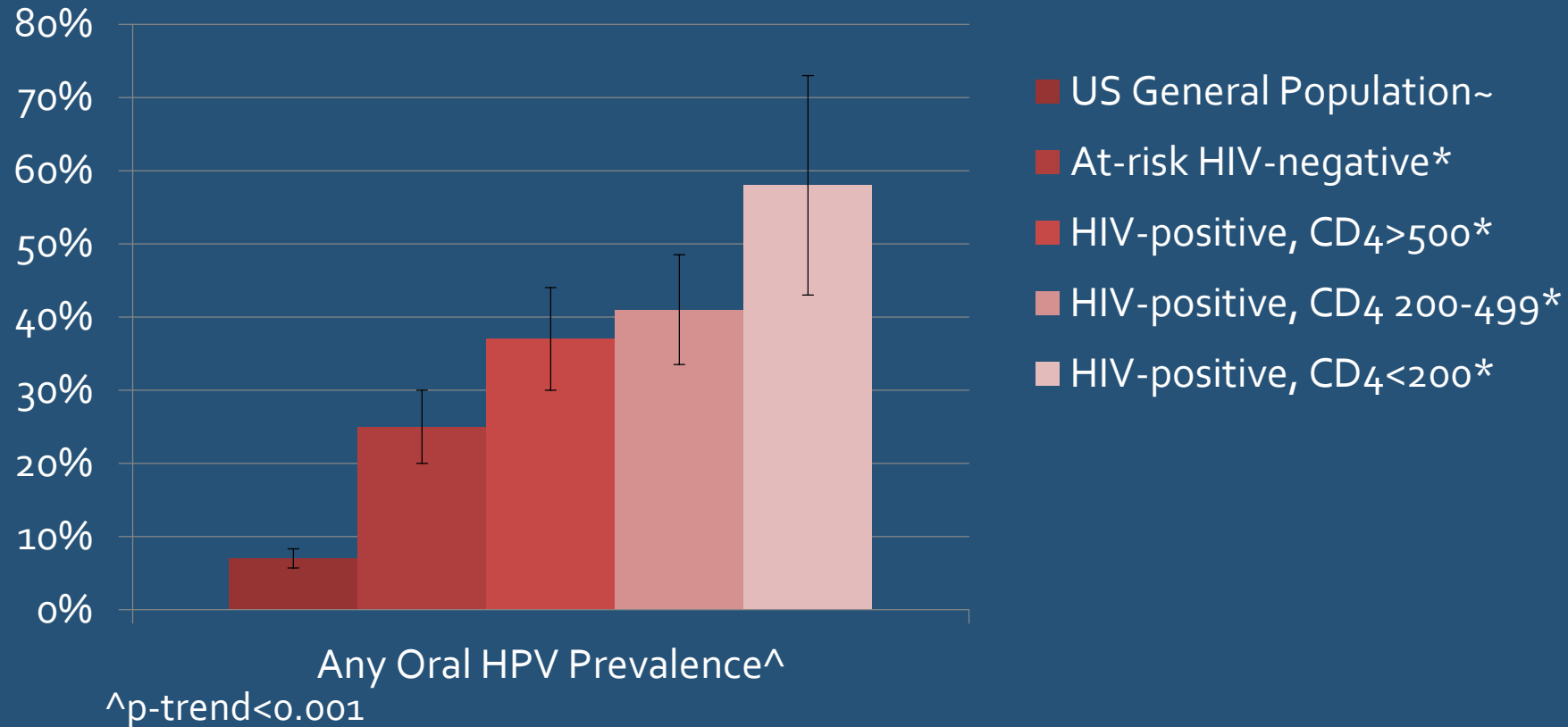
Oral HPV Prevalence & HIV



Adjusted for covariates including sexual behavior and cigarette use.

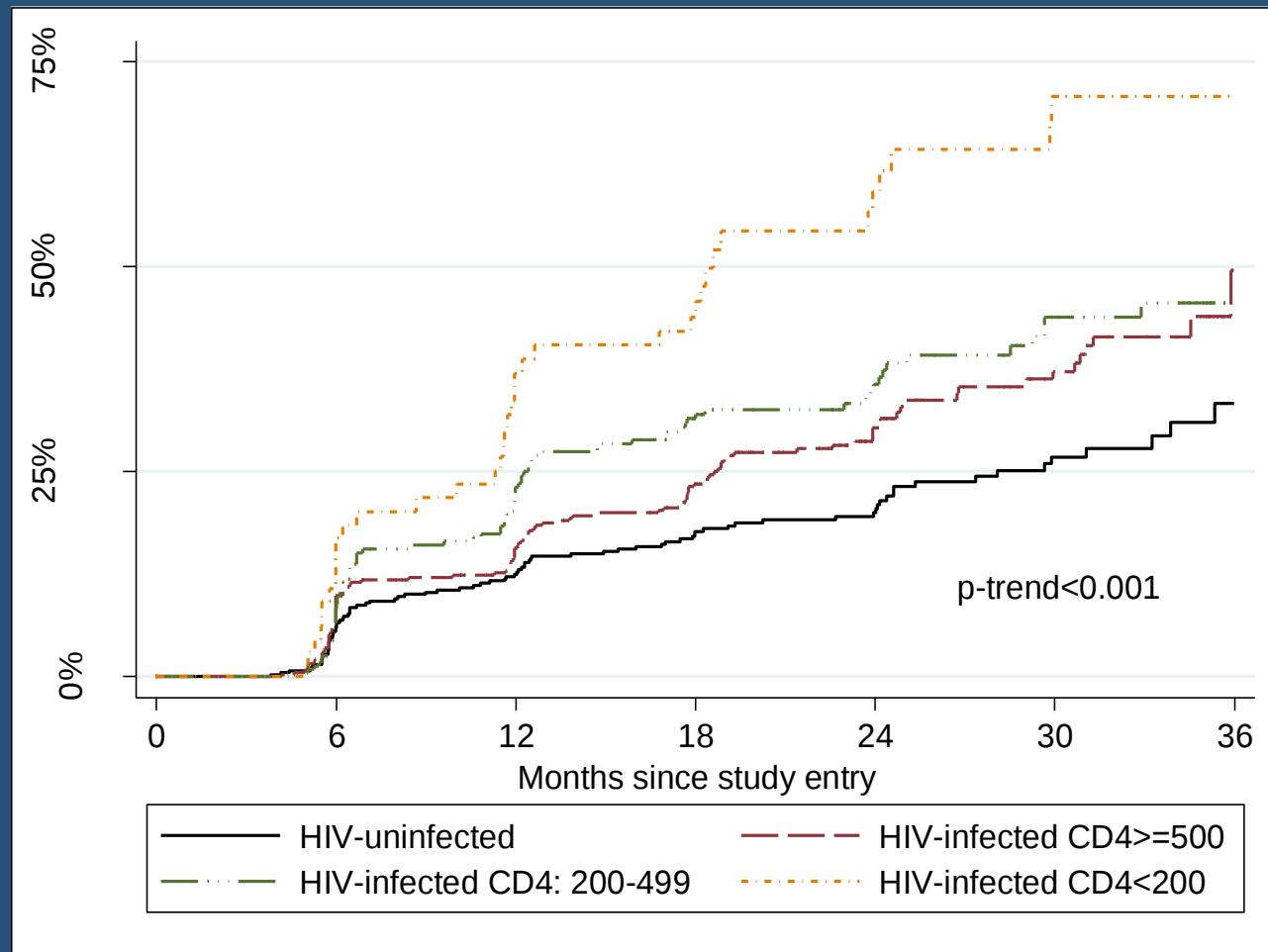
Beachler.... D'Souza. CEBP 2012 Jan. 21(1):122-33

Oral HPV Prevalence & HIV & CD4



Beachler.... D'Souza. CEBP 2012 Jan. 21(1):122-33

Cumulative Oral HPV Incidence & HIV & CD4



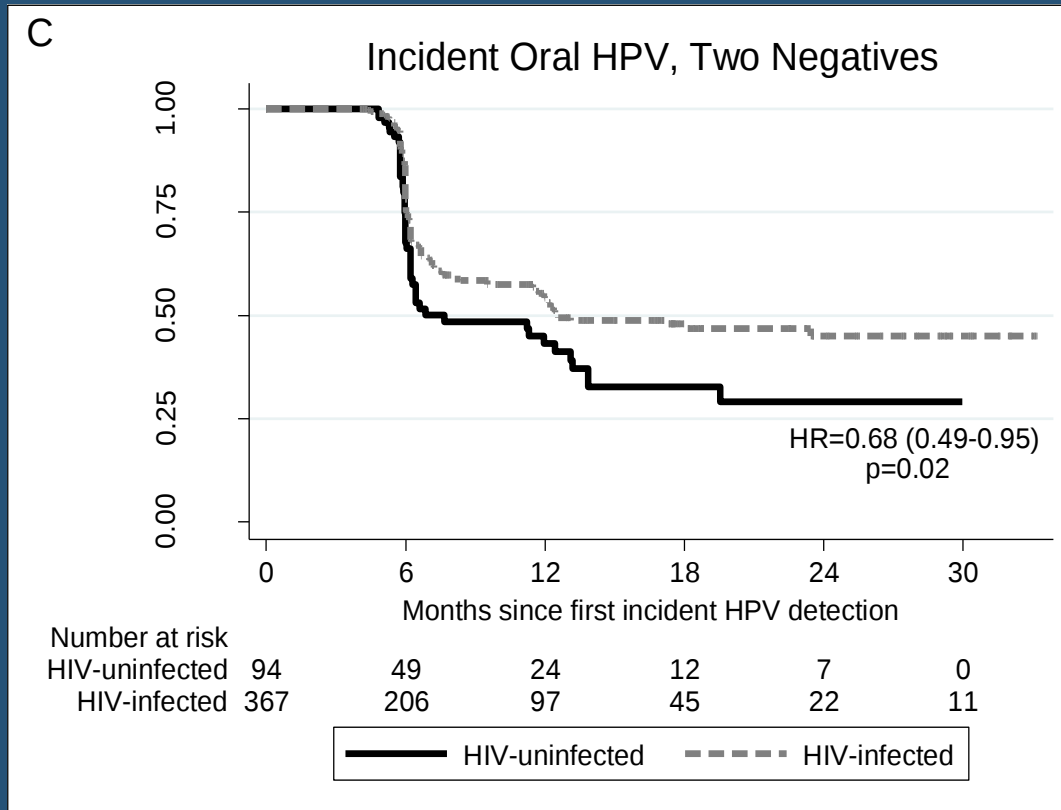
Beachler....D'Souza. AJE. 2015 Jan
1;181(1):40-53.

Oral HPV Clearance & HIV

Many oral HPV infections clear quickly on their own.

Within 2 years:

- In HIV-positive adults: ~55% of new infections clear
- In HIV-negative adults: ~66% of new infections clear



Why is Risk of Head and Neck Cancer Increased in HIV?

Increased prevalence of tobacco use

Higher sexual exposure → Oral HPV infection

- Increased acquisition

Effects of immune suppression on HPV

- Decreased clearance

Top 10 Cancers – U.S. HIV population vs. U.S. general population, 2004-2007

U.S. HIV population

1. Non-Hodgkin lymphoma
2. Kaposi sarcoma
3. Lung
4. Anal
5. Hodgkin lymphoma
6. Prostate
- 7. Oral cavity and pharyngeal**
8. Cervical
9. Colorectal
10. Breast

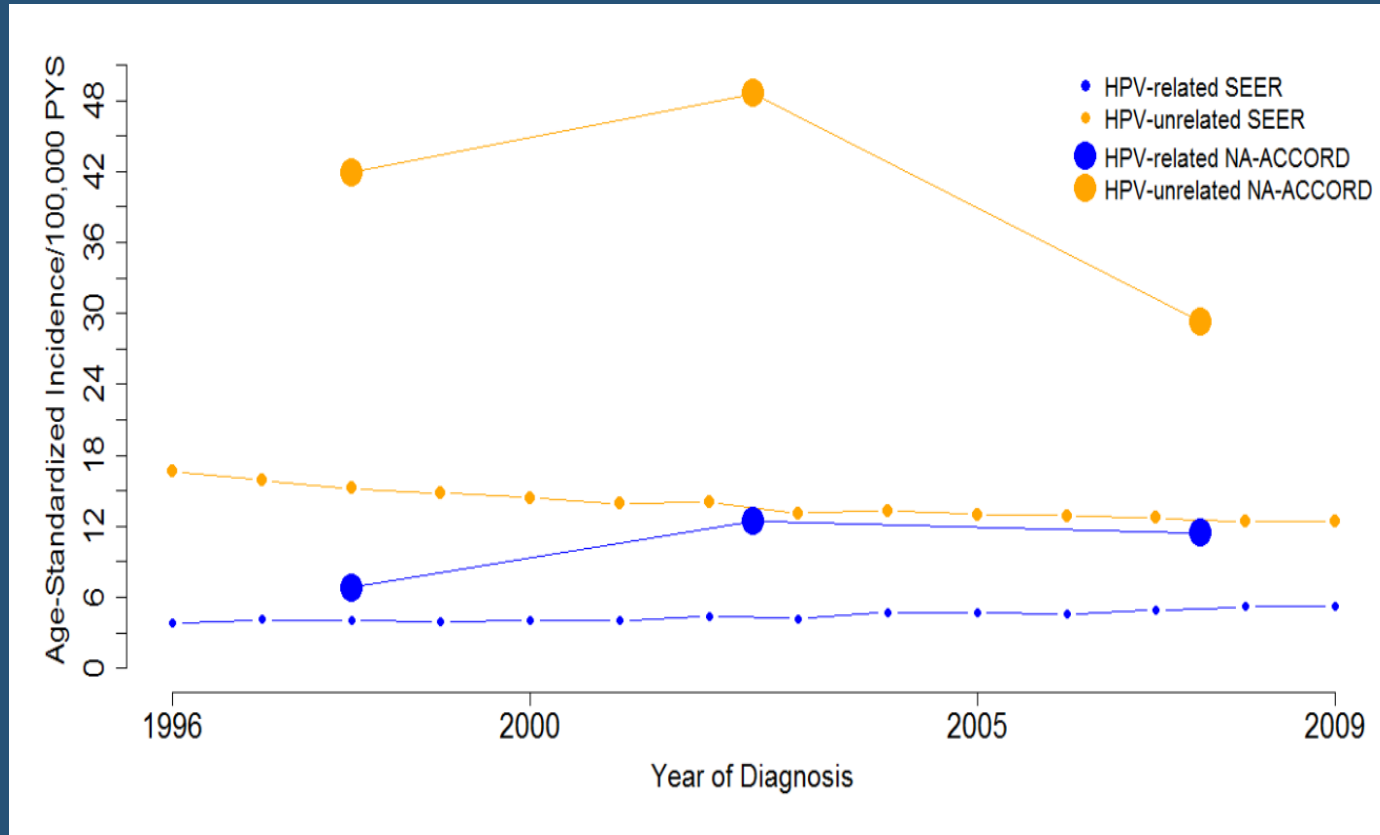
U.S. General population

1. Prostate
2. Breast
3. Lung
4. Colorectal
5. Urinary bladder
6. Melanoma
7. Non-Hodgkin lymphoma
8. Kidney and renal pelvis
9. Uterus
10. Leukemia

Shiels, JNCI 2011; Kohler JNCI 2011

Incidence of HNC in HIV-positive compared to general population, 1996-2009

Age-standardized incidence rates of **oropharyngeal (HPV-related)** and **other HNC (HPV-unrelated)** in NA-ACCORD compared to SEER



Beachler... D'Souza. *Oral Oncology*. 2014. Oct 6. 50; 1169-76.

Characteristics of cases with HIV-HNC

Case series of 94 HIV-positive patients with HNC

- 91% male
- Median 50 years (younger)
- 49% nonwhite
- 61% current smoker (not all smoke)
- 77% on ART but 99% detectable HIV viremia
- median CD4 300 cell/ μ l
- 30% of HIV-HNC , 64% of HIV-OPC were HPV-positive

D'Souza et al. JAIDS 2014 603-10

Thank you

Questions?



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