

Empowering Women and Girls on What They Need to Know About HIV/AIDS



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**CENTER FOR AIDS
HEALTH DISPARITIES RESEARCH
MEHARRY MEDICAL COLLEGE**

Disclosure

The following speaker of this CME activity
“Empowering Women and Girls on What
They Need to Know About HIV/AIDS ?”) has no
relevant financial relationships with commercial
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OBJECTIVES

At the end of the presentation, participants will be able to...

1. Know the incidence and risk factors for HIV infection rates in women and girls in U.S.
2. Discuss cost effective evidence based interventions to prevent HIV infection in women and girls
3. Discuss intimate partner abuse/violence as it relates to HIV/AIDS
4. Understand clinical conditions in women and girls that predisposes them to HIV acquisition like STI and BV
5. Discuss the vaginal microbiome and susceptibility to HIV/AIDS
6. Discuss the medical intervention of non occupational post exposure prophylaxis (nPEP)
7. Understand mother to child transmission and the success of treatment with ARVs

HIV can spread through:

The most common methods of transmission of HIV are:



Unprotected sex with an infected partner



Sharing needles with infected person

Almost eliminated as risk factors for HIV transmission are:

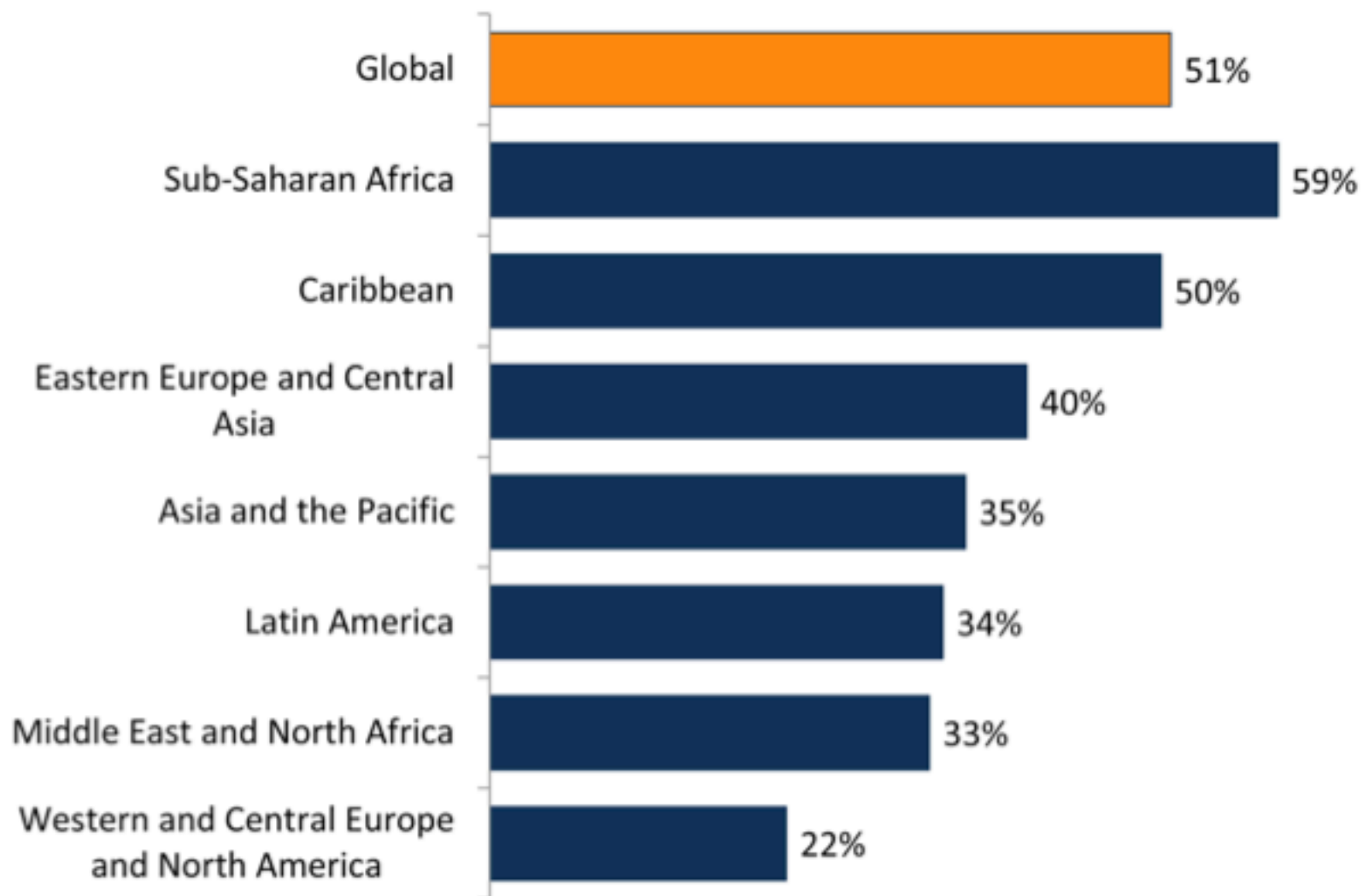


Transmission from infected mother to fetus



Infection from blood products

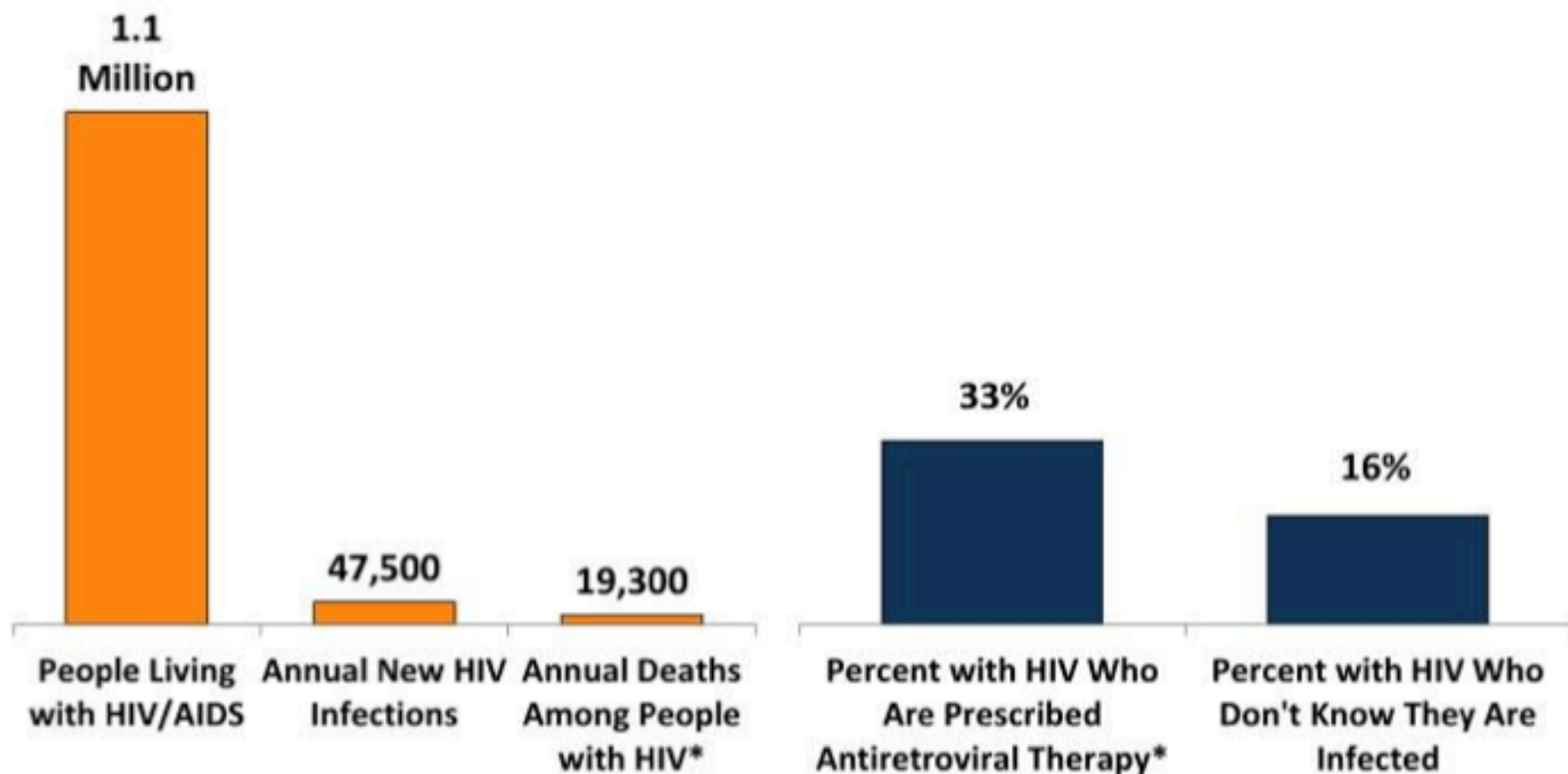
Women as Share of People Living with HIV by Region, 2014



NOTE: Among adults, aged 15 and older.

SOURCE: Kaiser Family Foundation, based on UNAIDS, How AIDS Changed Everything; 2015.

Snapshot of the U.S. HIV/AIDS Epidemic

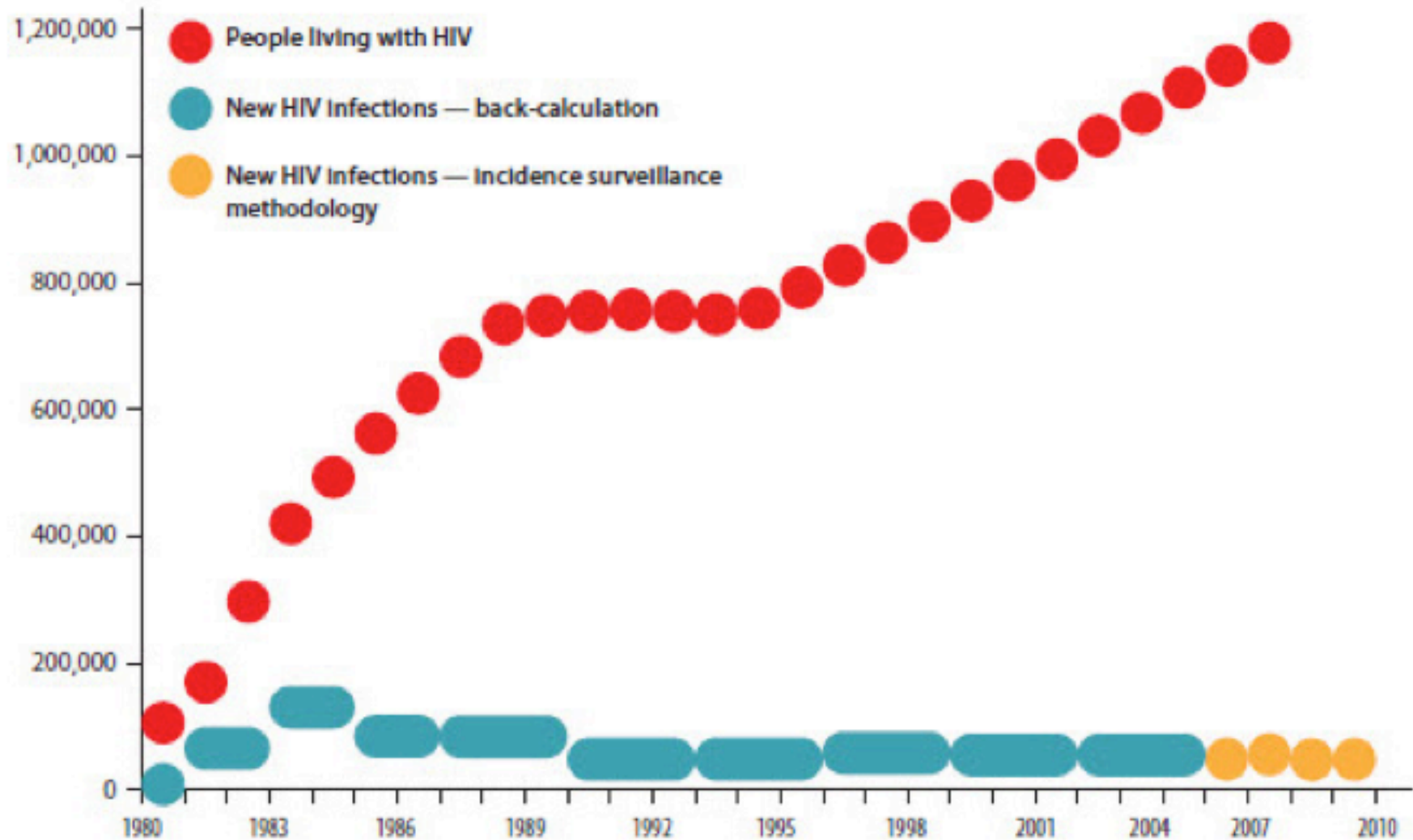


*Of those who are aware of their infection.

NOTE: Data are estimates.

SOURCES: CDC, HIV Surveillance Supplemental Report; Vol. 18, No. 5; October 2013. CDC, HIV Surveillance Supplemental Report; Vol. 17, No. 4; December 2012. CDC, HIV Surveillance Report, Vol. 23; February 2013. CDC, Fact Sheet – HIV in the United States: The Stages of Care; July 2012.

Number of Americans Living with HIV Has Grown, because New Infections Are Relatively Stable while Survival Has Increased



Hall *JAMA* 2008; Prejean *PloS One* 2011; *MMWR* 2011

MARCH
10, 2014

NATIONAL WOMEN & GIRLS HIV/AIDS AWARENESS DAY

PEOPLE LIVING WITH HIV¹



BLACK WOMEN ARE THE MOST IMPACTED BY HIV



1 in 526
WHITE



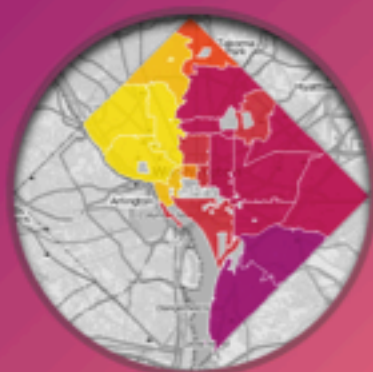
1 in 106
HISPANIC



1 in 32
BLACK

WOMEN WILL BE DIAGNOSED WITH
HIV IN THEIR LIFETIME²

HIV INFECTIONS ARE
CONCENTRATED IN URBAN AREAS³

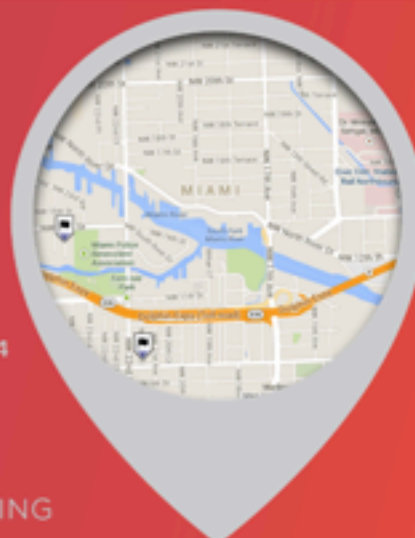


WASHINGTON, D.C.

ONLY
50
PERCENT

OF *women* HAVE EVER
BEEN TESTED FOR HIV⁴

FIND YOUR LOCAL
TESTING SITE AT
AIDSVU.ORG/TESTING



HIV IS NO LONGER
A DEATH SENTENCE WITH EARLY
DIAGNOSIS & TREATMENT



FIND YOUR LOCAL TREATMENT SITE AT
AIDSVU.ORG/TREATMENT

TAKE ACTION: GET TESTED AIDSVU.ORG/TESTING

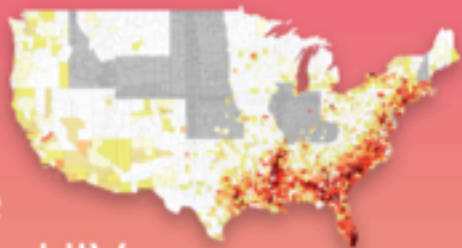
¹ Centers for Disease Control and Prevention (CDC) <http://www.cdc.gov/hiv/risk/gender/women/facts/index.html>

² Kaiser Family Foundation <http://kaiserfamilyfoundation.files.wordpress.com/2013/04/8436.pdf>

³ Centers for Disease Control and Prevention (CDC) http://www.cdc.gov/hiv/surveillance/resources/reports/2011report/pdf/2011_hiv_surveillance_report_vol_23.pdf

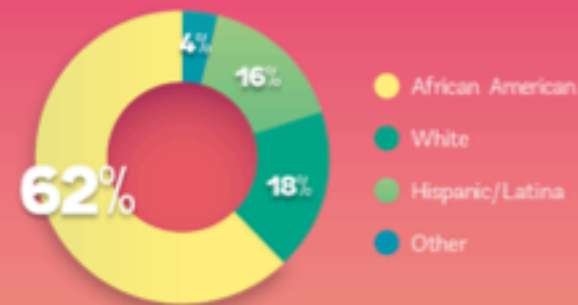
⁴ Centers for Disease Control and Prevention (CDC) <http://www.cdc.gov/nchhstp/newsroom/docs/Viral-Signs-Fact-Sheet.pdf>

In the U.S., nearly **25%** of people living with HIV are women



RATES OF FEMALES LIVING WITH AN HIV OR AIDS DIAGNOSIS, 2012

Women ages **25 to 39** account for **40%** of all **new HIV diagnoses** among women



African American women continue to bear the **heaviest burden of new HIV diagnoses**

Out of every **10** women living with HIV:

9 have been diagnosed

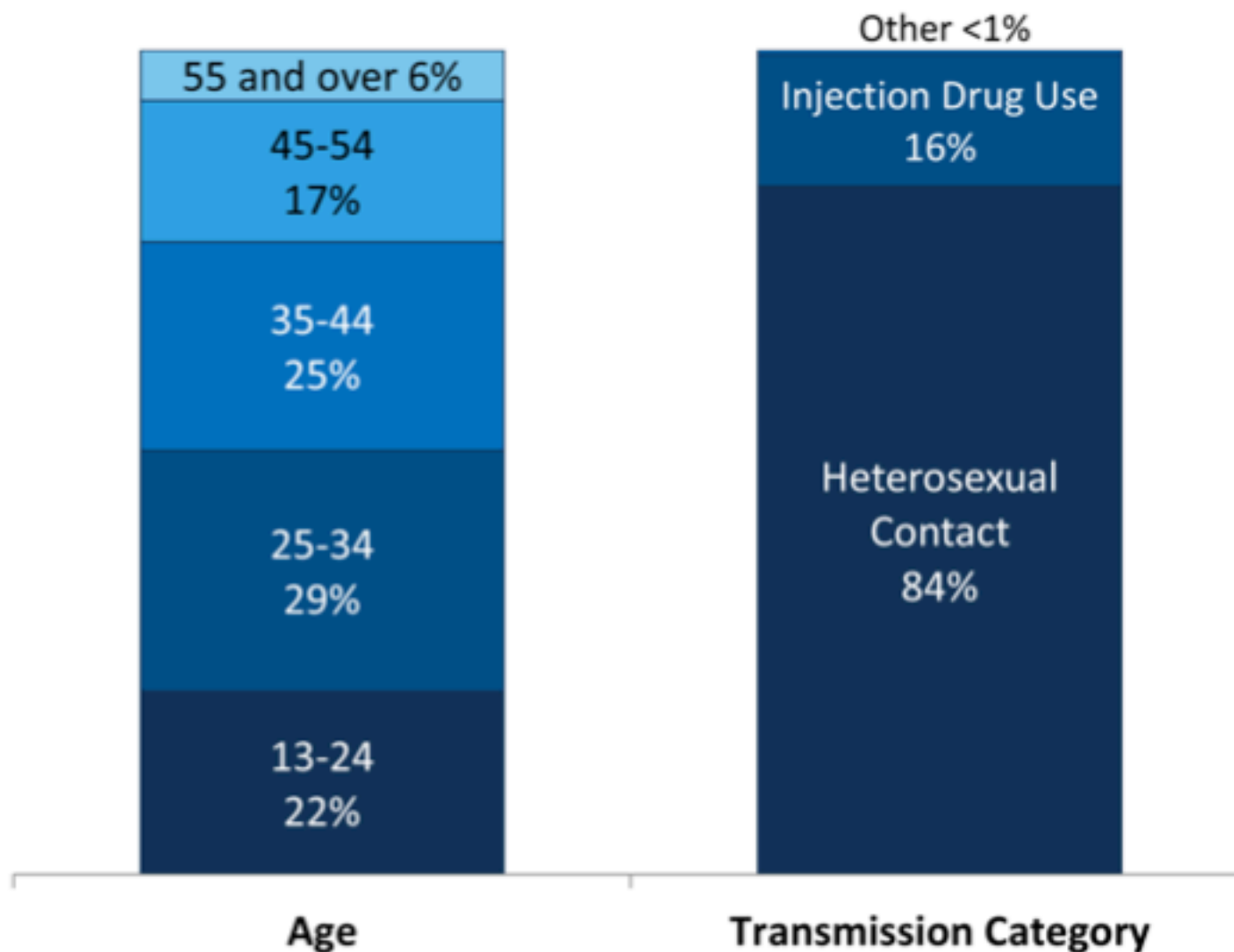
5 are engaged in care

3 have achieved viral suppression

HIV TESTING and linkage-to-care have reduced mother-to-child HIV transmission by **MORE THAN 90%**



New HIV Infections Among Women & Girls, by Age and Transmission Category, 2010



NOTES: Data are estimates among those ages 13 and older and do not include U.S. dependent areas. Age distribution only includes white, Black, and Latina women and girls. Distribution by transmission category includes all women and girls.

SOURCE: CDC, HIV Surveillance Supplemental Report, Vol. 17, No. 4; December 2012.

National Women and Girls HIV/AIDS Awareness Day (NWGHAAD) is March 10.

HIV remains a significant health issue for women and adolescent girls, with more than 280,000 women living with HIV in the United States. In 2014, an estimated 8,328 women aged 13 and older were diagnosed with HIV. The majority of these diagnoses can be attributed to heterosexual sex.

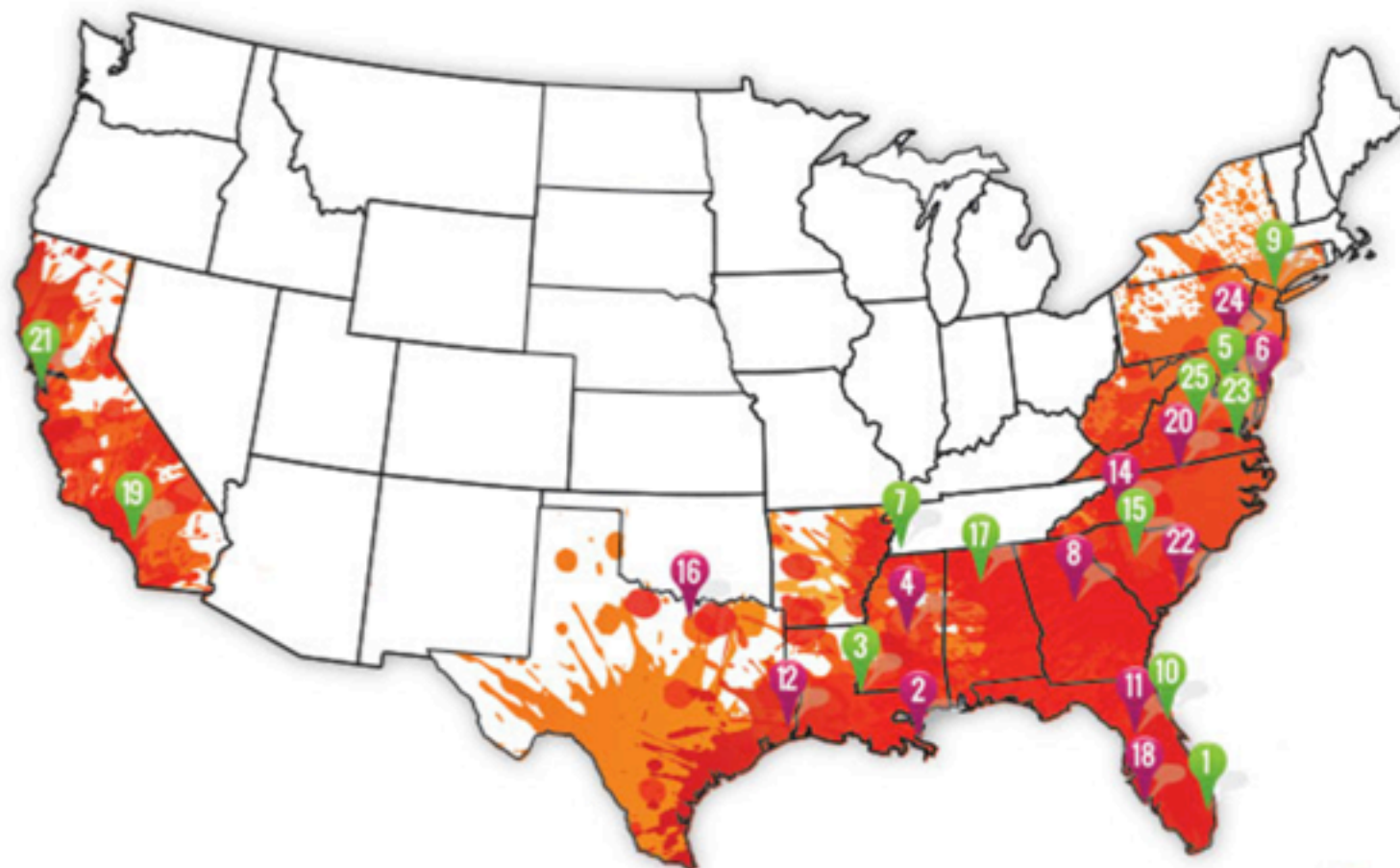
Black/African American* and Hispanic/Latina** women continue to be disproportionately affected by HIV. Among all US women in 2014,

- Black women accounted for 62% of new HIV diagnoses but only 13% of the female population.
- Hispanic/Latina women accounted for 16% of new diagnoses but only 15% of the female population.
- Whites accounted for 18% of new diagnoses and 64% of the female population.

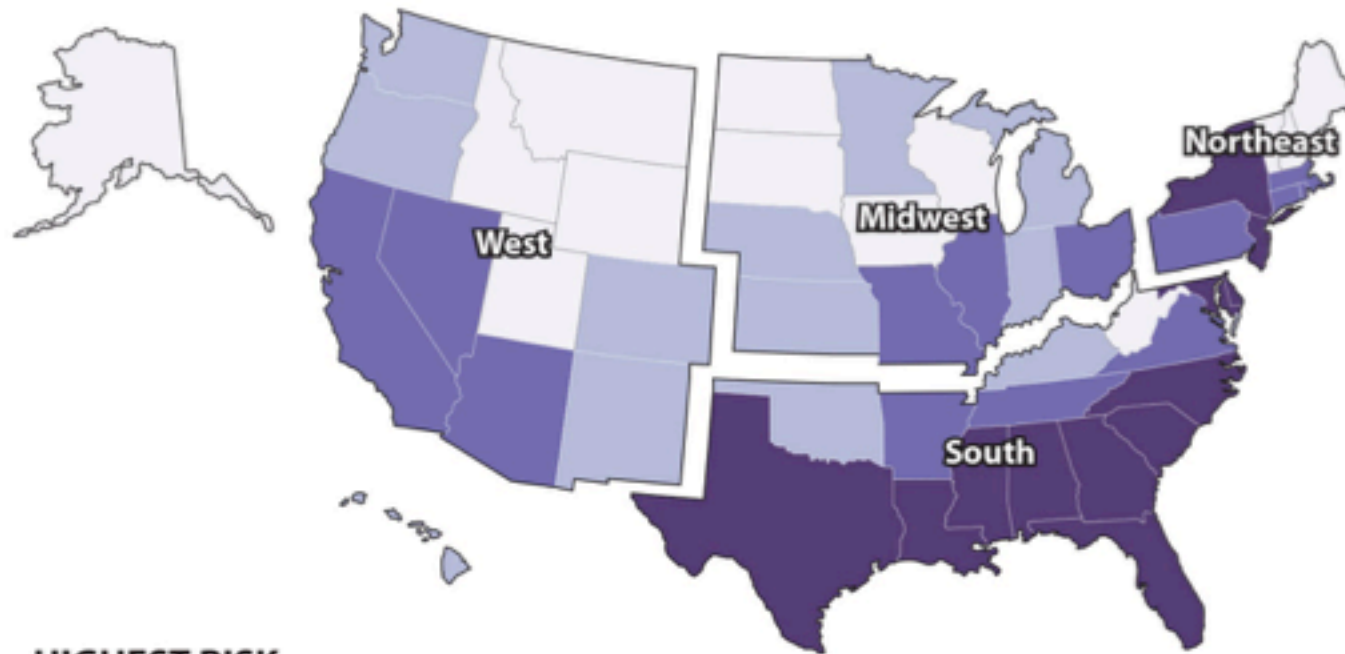
Nevertheless, we are making progress in the fight against HIV among women. From 2005 to 2014, new HIV diagnoses declined 40% among all women and even more (42%) among black women. And for black women newly diagnosed with HIV, the percentage linked to HIV medical care increased 48% from 2012 to 2014.

The 25 U.S. Cities With the Highest Rates of HIV Infection

In its 2013 HIV Surveillance Report, the Centers for Disease Control released a collection of data from state and local health departments that tracked the rate of new HIV infections across the country in 2011. Listed below are the U.S. cities and major metropolitan areas with the highest rates of new infections per capita.



Lifetime Risk of HIV Diagnosis by State



HIGHEST RISK

LOWEST RISK

State	One in "n"	State	One in "n"	State	One in "n"	State	One in "n"
District of Columbia	13	Nevada	98	Michigan	167	West Virginia	302
Maryland	49	Illinois	101	Oklahoma	168	Wisconsin	307
Georgia	51	California	102	Kentucky	173	Iowa	342
Florida	54	Tennessee	103	Indiana	183	Utah	366
Louisiana	56	Pennsylvania	115	Washington	185	Maine	373
New York	69	Virginia	115	Colorado	191	Alaska	384
Texas	81	Massachusetts	121	New Mexico	196	South Dakota	402
New Jersey	84	Arizona	138	Hawaii	202	New Hampshire	411
Mississippi	85	Connecticut	139	Oregon	214	Wyoming	481
South Carolina	86	Rhode Island	143	Minnesota	216	Vermont	527
North Carolina	93	Ohio	150	Kansas	262	Idaho	547
Delaware	96	Missouri	155	Nebraska	264	Montana	578
Alabama	97	Arkansas	159			North Dakota	670

Source: Centers for Disease Control and Prevention

HIV Infection and Teens

The new YRBS report shows mixed results regarding youth sexual risk behaviors. While teens are having less sex, condom use among currently sexually active students and HIV testing among all students has declined. The percentage of high school students who are currently sexually active (had sexual intercourse during the past three months) has decreased from **38% in 1991 to 30% in 2015**. There is also a significant decrease from 2013 (34%). However, among high school students who are currently sexually active, condom use has declined from **63% in 2003 to 57 percent in 2015**. This decline follows a period of increased condom use throughout the 1990s and early 2000s.

Parents if your teenager is sexually active its not the end of the world but it represents the end of **abstinence** only conversation.

“Meharry’s Annual HIV Awareness Summit for Teens”

How Do Teens Become Infected With HIV?

Sharing needles or other paraphernalia used in injection drug use and **risky sexual practices** are the two main ways that HIV is spread.

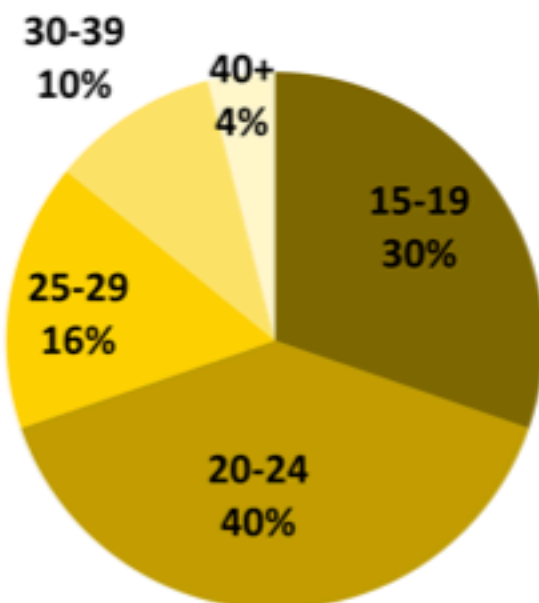
Almost all young women are infected through **heterosexual sexual contact**, and the risk factors continue to include **early sexual behavior, high numbers of sexual partners**, and **sexually transmitted infections**, which increase the likelihood of contracting HIV.

UNICEF

Nancy L. Brown, PhD

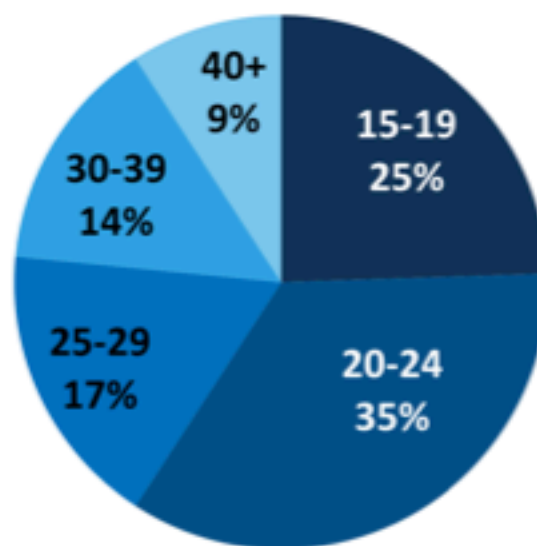
Most New Cases of Sexually Transmitted Infections Occur in Youth and Young Adults

Chlamydia, by age



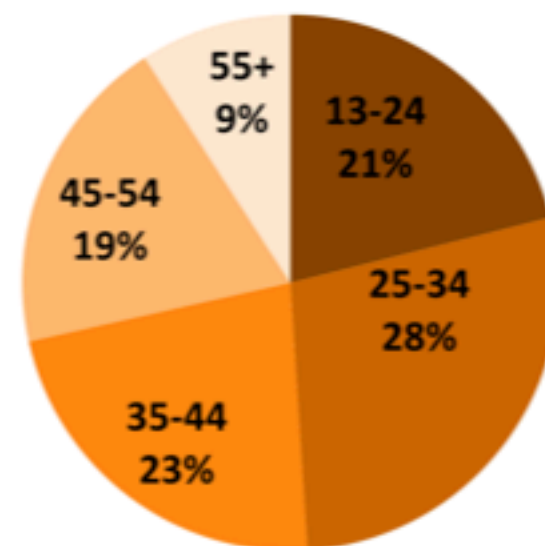
Total new cases in 2012 = 1,422,976

Gonorrhea, by age



Total new cases in 2012 = 334,826

HIV diagnosis, by age



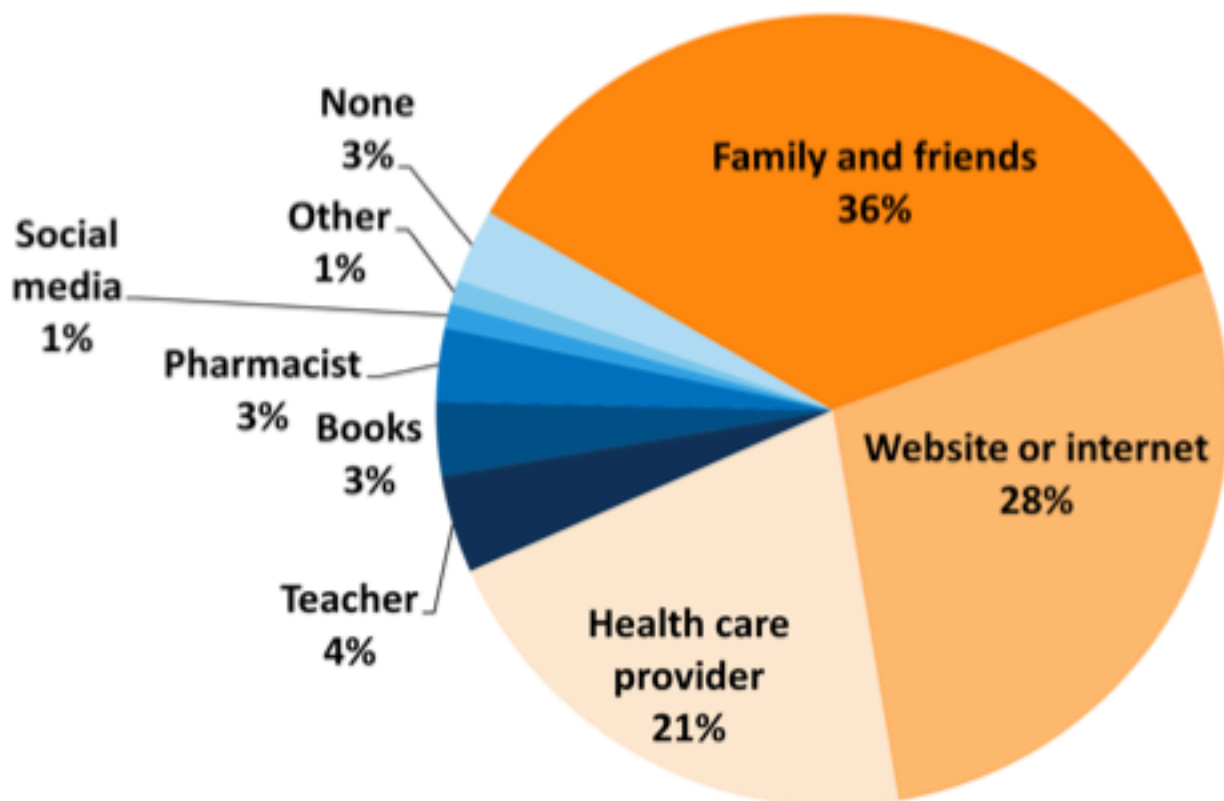
Total cases diagnosed in 2011 = 49,273

NOTE: Totals may not add to 100% due to rounding and exclusion of infections diagnosed in persons <15 for Chlamydia and Gonorrhea and <13 for HIV diagnosis.

SOURCE: CDC, Reported STDs in the United States: 2012 National Data for Chlamydia, Gonorrhea, and Syphilis, 2013. HIV Surveillance Report: Diagnosis of HIV Infection in the United States and Dependent Areas 2011, 2012.

Teens Primarily Get Information on Sexual and Reproductive Health from Family and Friends, Websites, or Health Care Providers

Where teens get information on sexual and reproductive health:



NOTES: Among women ages 15-19.

SOURCE: Kaiser Family Foundation, 2013 Kaiser Women's Health Survey.



Additional Risk factor in Teens for HIV Infection

Intimate partner abuse increases the risk for Sexually Transmitted Infections

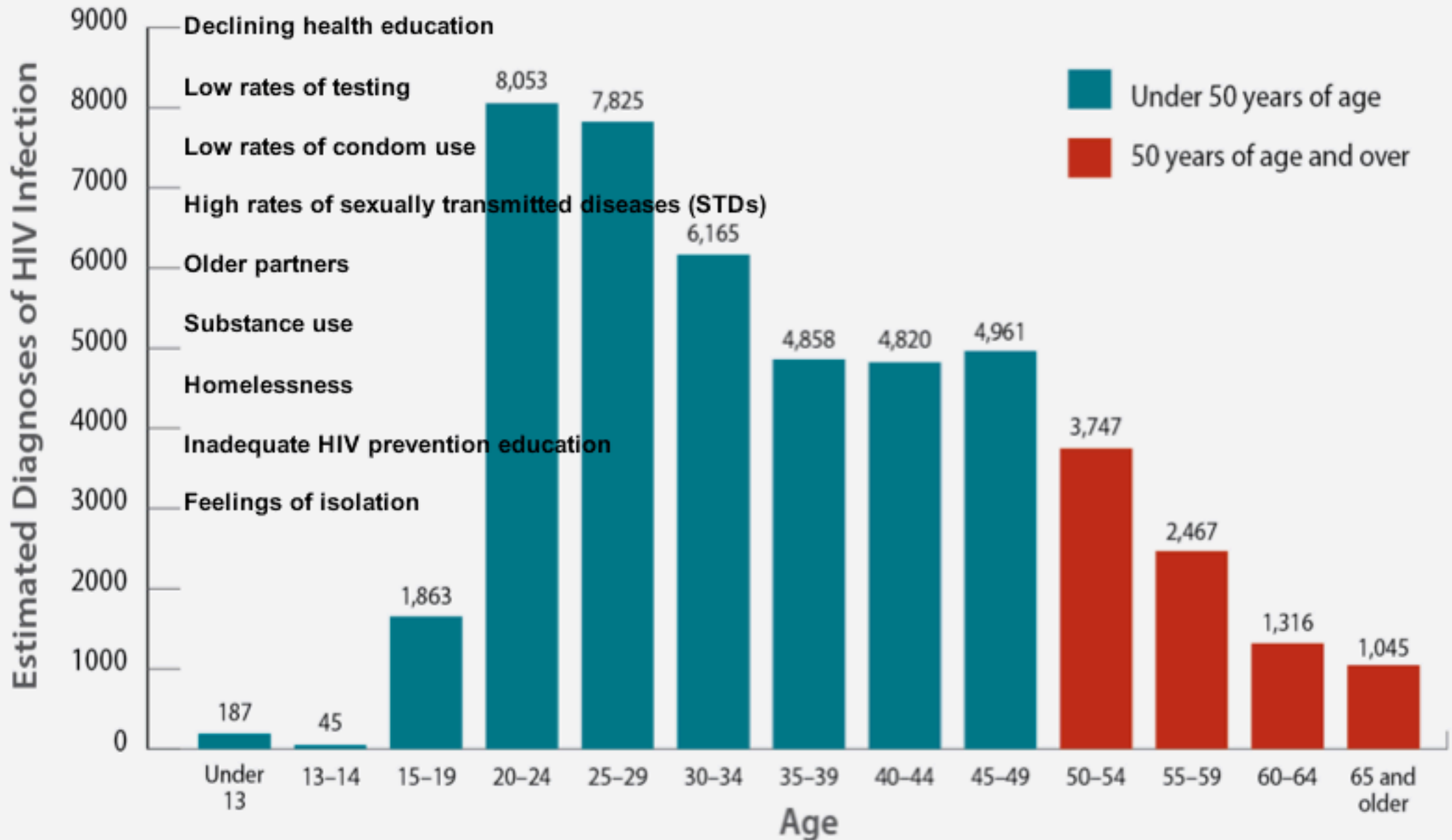
Unhealthy sex is involving violence and controlling behaviors. Young men who perpetrate IPV (physical or sexual) are more likely to have HIV or other STIs, and they are more likely to coerce partners into nonuse of condoms, have other partners, and engage in transactional sex.

Obesity and being overweight in adolescent girls more predictive in high-risk sexual behavior

Compare with normal-weight peers, the researchers found that obese and overweight adolescent girls were more likely to have sex before the age of 13 years and to have more than 3 lifetime partner, and were less likely to use condoms or contraception.

Estimated Diagnoses of HIV Infection by Age, 2013, United States

Low perception of risk



Risk for HIV Infection Among Lesbians

Oral sex - the risk of HIV being passed on through **oral sex is low**, but it is increased if a woman has **cuts or sores in her mouth**, or if the partner receiving oral sex has sores on her genitals or is having her period. Oral sex is safer if you use a 'dental dam' (a square of latex or cling film) to stop any **vaginal fluid or menstrual blood getting into your mouth**. A condom cut open and spread flat can also be used for this.

Sharing sex toys - sharing sex toys (for example **vibrators**) can be risky if they have vaginal fluids (juice), **blood or faeces** on them. Always clean them well and have one each. This is one area of sex where sharing is a bad idea!

Rough sex - any sexual activity that can lead to **bleeding or cuts/breaks** in the lining of **vagina or anus** is risky, including **'fisting'** or certain S&M (sodomasochism) activities.

Donor insemination - if a woman is thinking about using a **sperm donor** to get pregnant, she needs to be aware of the potential donor's detailed medical history and any possible risk factors - including **drug use and sexual history**. It is important that the donor has taken an HIV test.

HIV Infection and Risk Among the Elderly

Older people are at increasing risk for HIV/AIDS and other STDs.

About 24 percent of all people with HIV/AIDS in this country are age 50 and older. Because older people don't get tested for HIV/AIDS on a regular basis, there may be even more cases than currently known.

This increase is partly due to highly active antiretroviral therapy (HAART), which has made it possible for many HIV-infected persons to live longer, and partly due to newly diagnosed infections in persons over the age of 50.

Factors contribute to the increasing risk of infection in older people

Older Americans know less about HIV/AIDS and STDs than younger age groups because the elderly have been neglected by those responsible for education and prevention messages.

Older people are less likely than younger people to talk about their sex lives or drug use with their doctors, and doctors don't tend to ask their older patients about sex or drug use.

Older people often mistake the symptoms of HIV/AIDS for the aches and pains of normal aging, so they are less likely to get tested.

African American women are 7 times more likely to be incarcerated in their lifetime than white women.

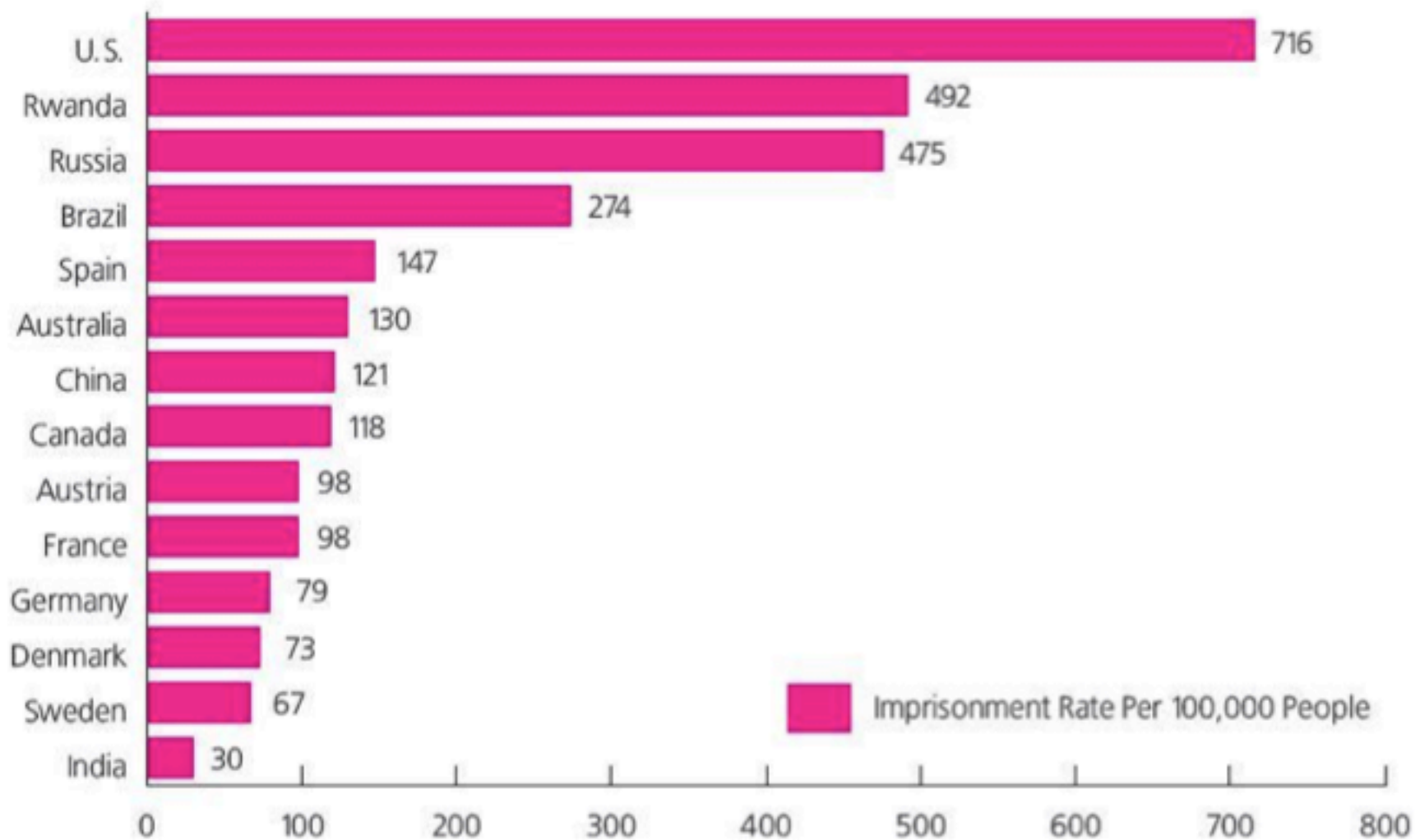
Incarcerated women have higher rates of HIV and sexually transmitted infections (STI) than the general population.

In 2010 1.9% of incarcerated adult women in the U.S. were HIV positive which is 13 times the rate of adult women in the general population (0.15%).

There are approximately 23,000 HIV infected adult women released from correctional institutions annually in the U.S. with the majority being African American women.

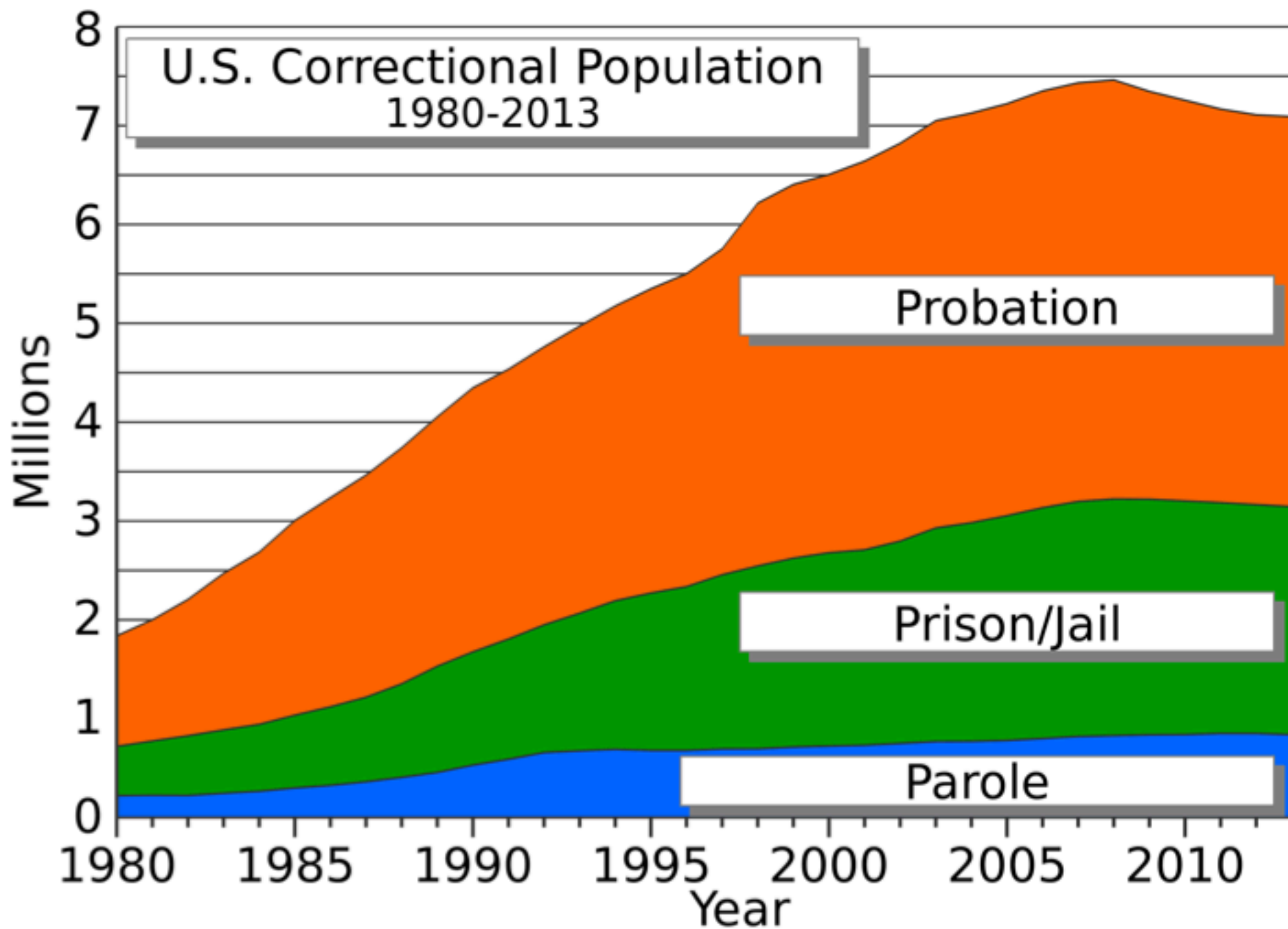
1. [Kouyoumdjian FG](#), [Leto D](#), [John S](#), [Henein H](#), [Bondy S](#). A systematic review and meta-analysis of the prevalence of chlamydia, gonorrhoea and syphilis in incarcerated persons. *Int J STD AIDS*. 2012; 4:248-254.
2. [Fogel CI](#), [Crandell JL](#), [Neevel AM](#), [Parker SD](#), [Carry M](#), [White BL](#), [Fasula AM](#), [Herbst JH](#), [Gelaude DJ](#). Efficacy of an adapted HIV and sexually transmitted infection prevention intervention for incarcerated women: a randomized controlled trial. *Am J Public Health*. 2015; 4:802-809.
3. Centers for Disease Control and Prevention. HIV Surveillance Report, 2010. Vol. 22. Atlanta, GA: US Dept of Health and Human Services; 2012. Available at: http://www.cdc.gov/hiv/surveillance/resources/reports/2010_report/pdf/2010_HIV_Surveillance_Report_vol_22.pdf. Accessed May 21, 2014.
4. Spaulding AC, Seals RM, Page MJ, Brzozowski AK, Rhodes W, Hammett TM. HIV/AIDS among inmates of and releasees from US correctional facilities, 2006: declining share of epidemic but persistent public health opportunity. *PLoS ONE*. 2009;11:e7558.

International Rates of Incarceration, 2012/2013



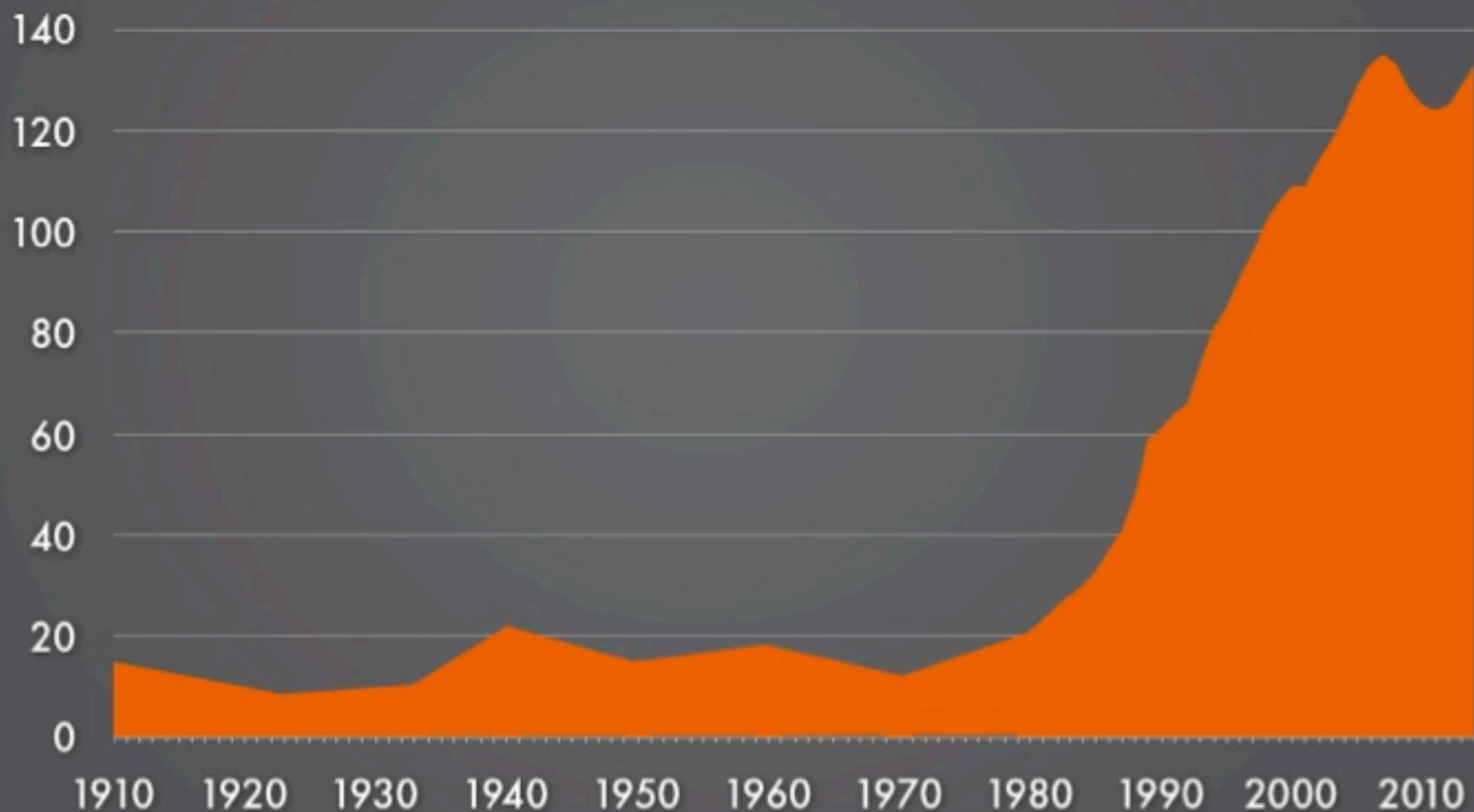
Source: Walmsley, R. (2013). *World Population List, 10th Ed.* Essex: International Centre for Prison Studies.





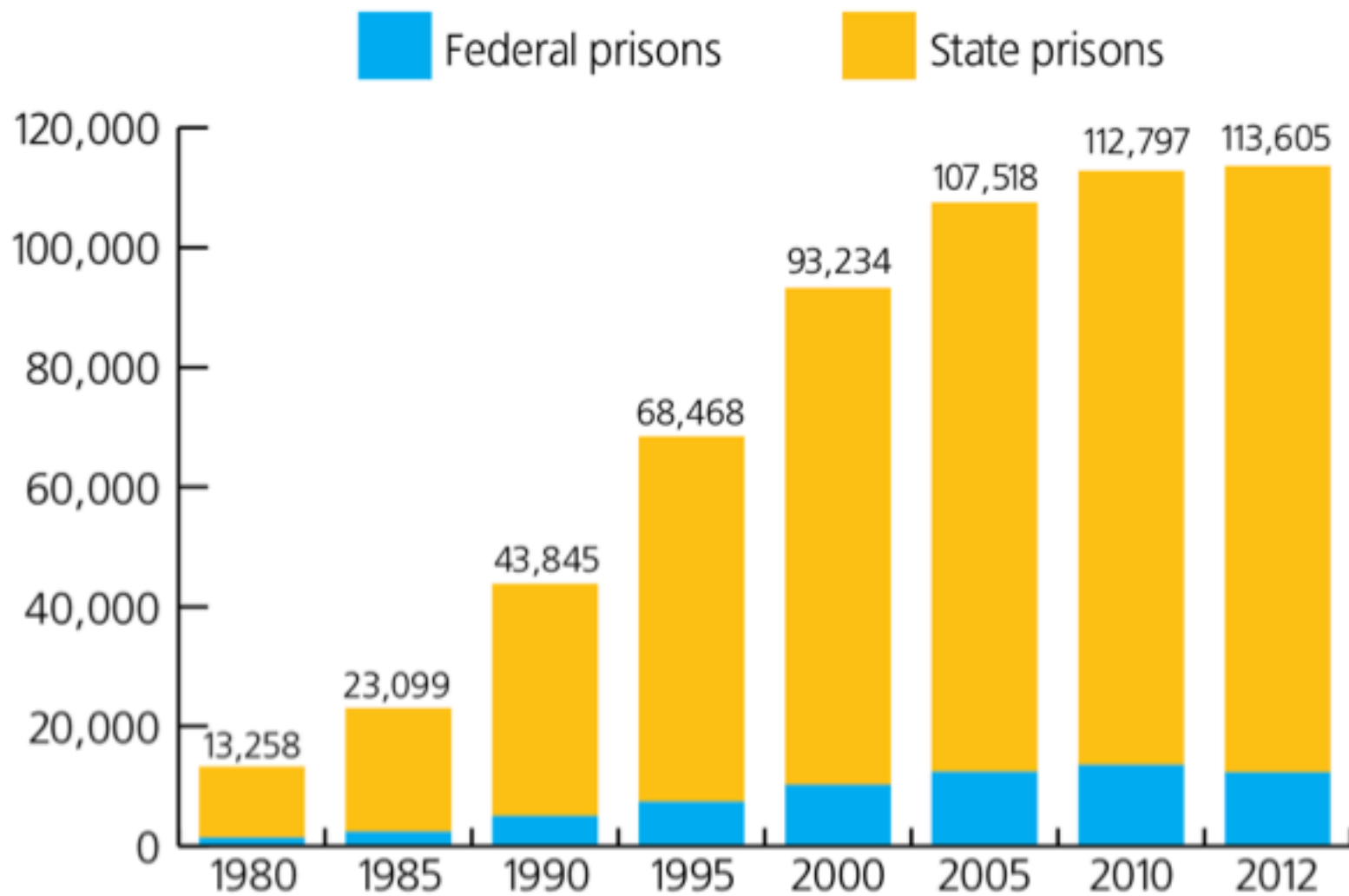
WOMEN'S INCARCERATION RATE UNITED STATES 1910-2014

(Number of women incarcerated per 100,000 women, 1910- 2014)



Compiled by the Prison Policy Initiative. For detailed sourcing see <http://www.prisonpolicy.org/global/women/>

Number of Women in State and Federal Prisons, 1980-2012



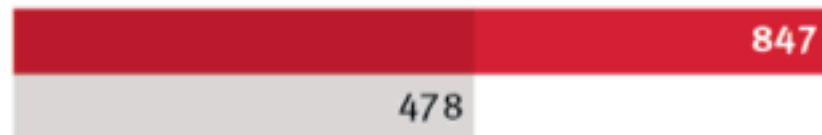
Source: Carson, E.A., Golinelli, D. (2013). *Prisoners in 2012*.
Washington, D.C.: Bureau of Justice Statistics

Louisiana has the highest HIV infection and incarceration rates of any US state.

HIV infections per 100,000



Prisoners per 100,000



Social Determinants/Co-Factors for HIV Acquisition

■ *Politics and Bureaucracy*

- Unwillingness to involve community voices in community solutions.
- Discrimination/Racism/Classism
- Apathy
- Territorial issues/Greed
- Community based vs. Community driven interventions
- Mistrust and Suspicion
- Media

■ *Lack of voluntary testing – unknown status*

- Denial
- Fear
- Stigma
- Ignorance

■ *Lack of community empowerment and involvement*

- Knowledge Inequity

■ *Socioeconomic Issues*

- Poverty
- Underinsured or Uninsured
- Lack of access to services
- Incarceration
- Dense Social Networks

■ *Low-self esteem*

- Substance use and abuse
- Lack of negotiation skills
- Domestic violence

■ *Existing sexually transmitted diseases*

- Unfaithful relationships or multiple Sex partners
- Unprotected sexual intercourse

■ *Lack capacity in developing sustainable relationships.*

- Cultural Competence

HIV/AIDS Awareness Summit for Teens

Sponsored by Meharry Medical College, Center for AIDS Health Disparities Research (CAHDR)

Hubbard Hospital 5th Floor
CAHDR Conference Room



Summer

9:00 AM to 9:30

Registration

9:30 AM to 9:45

Welcoming of Teens, Friends & Family (Walter Braden)

9:45 AM to 10:45

“What teens need to know about HIV/AIDS”
(Lecture by Dr. Donald J. Alcendor, PhD)

10:45 AM to 11:45

Questions and Answers/Parents Participation
(Moderator Dr. Donald J. Alcendor, PhD)

11:45 AM to 12:00

Break

12:00 PM to 12:30

Tour of the HIV Center Research Facilities

Evidence based alternatives





Office of
Women's Health

THOUSANDS
of Women
— Are Infected —
WITH HIV
Every Year

LEARN HOW TO PROTECT YOURSELF

**Protect yourself and your partner.
Today, more tools than ever are
available to prevent HIV.**

You can

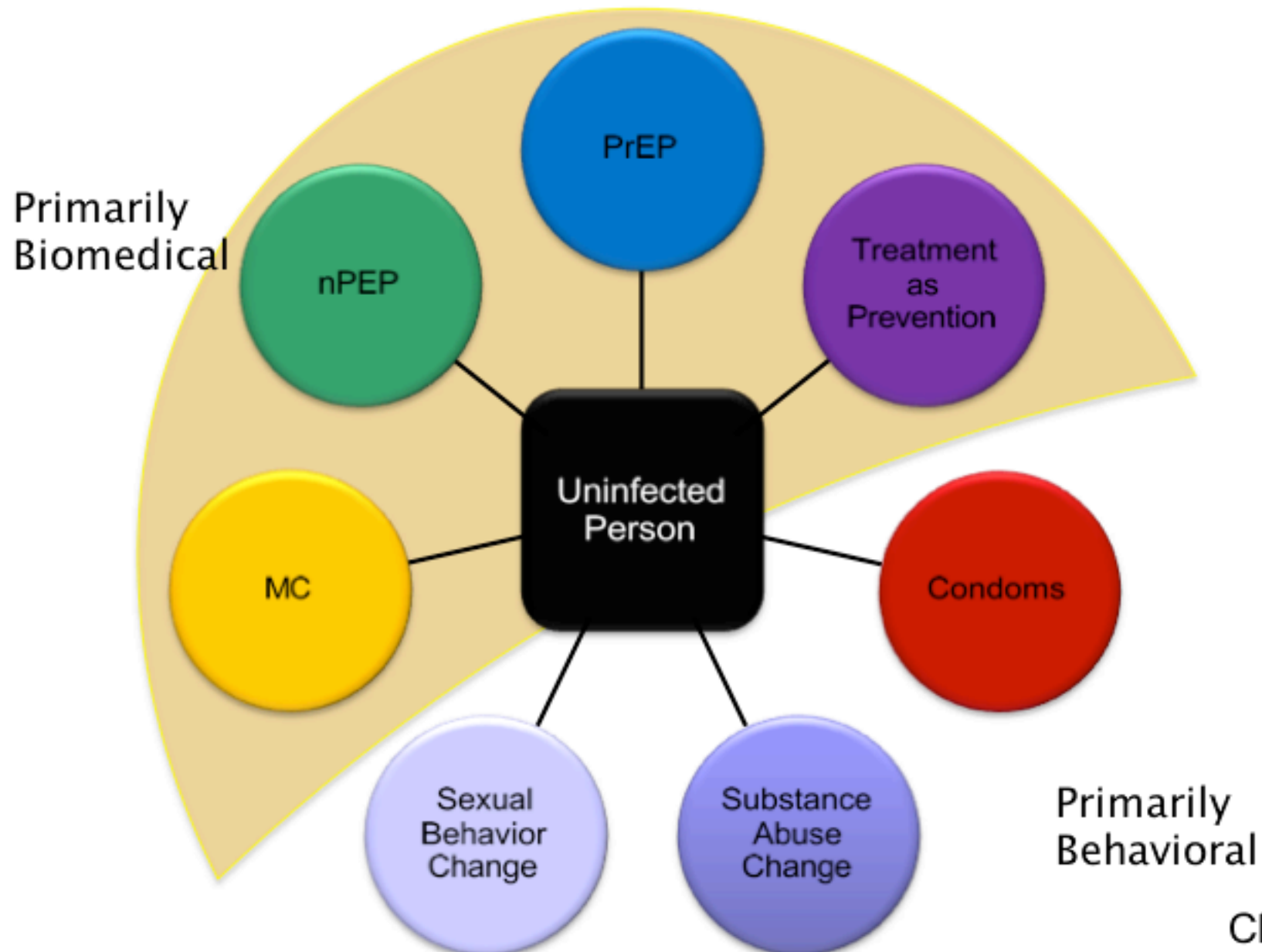
- Use condoms the right way every time you have sex. Learn the right way to use a male condom.
- Choose less risky sexual behaviors.
- Limit your number of sexual partners.
- Never share needles.
- Talk to your doctor about pre-exposure prophylaxis (PrEP), taking medicine daily to prevent HIV infection, if you are at very high risk for HIV.
- Talk to your doctor about post-exposure prophylaxis (PEP) if you think you may have been exposed to HIV within the last 3 days through sex, sharing needles and works, or a sexual assault.

Summary of Guidance for PrEP Use

	Men Who Have Sex With Men	Heterosexual Women and Men	Injection Drug Users
Detecting substantial risk of acquiring HIV infection:	<ul style="list-style-type: none"> Sexual partner with HIV Recent bacterial STD High number of sex partners History of inconsistent or no condom use Commercial sex work 	<ul style="list-style-type: none"> Sexual partner with HIV Recent bacterial STD High number of sex partners History of inconsistent or no condom use Commercial sex work Lives in high-prevalence area or network 	<ul style="list-style-type: none"> HIV-positive injecting partner Sharing injection equipment Recent drug treatment (but currently injecting)
Clinically eligible:	<ul style="list-style-type: none"> Documented negative HIV test before prescribing PrEP No signs/symptoms of acute HIV infection Normal renal function, no contraindicated medications Documented hepatitis B virus infection and vaccination status 		
Prescription	Daily, continuing, oral doses of TDF/FTC (Truvada), ≤90 day supply		
Other services:	<ul style="list-style-type: none"> Follow-up visits at least every 3 months to provide: HIV test, medication adherence counseling, behavioral risk reduction support, side effect assessment, STD symptom assessment At 3 months and every 6 months after, assess renal function Every 6 months test for bacterial STDs 		
	<ul style="list-style-type: none"> Do oral/rectal STD testing 	<ul style="list-style-type: none"> Assess pregnancy intent Pregnancy test every 3 months 	<ul style="list-style-type: none"> Access to clean needles/syringes and drug treatment services

Source: US Public Health Service. Preexposure prophylaxis for the prevention of HIV infection in the United States —2014: a clinical practice guideline.

Combining Partially Effective Prevention Methods



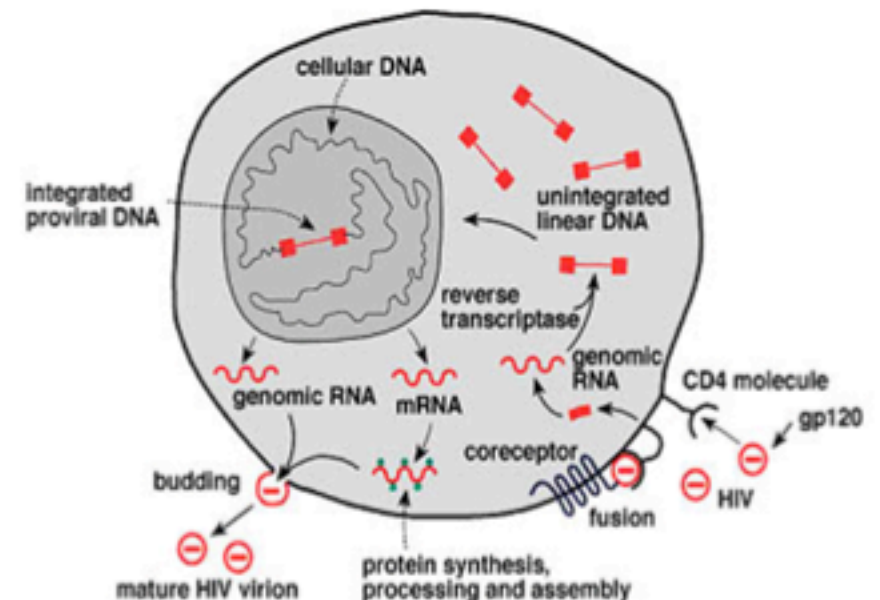
TIME TO DEVELOP A VACCINE

Duration between discovery of microbiologic cause of selected infectious diseases and development of a vaccine

Typhoid	1884	105 years	1989
Pertussis	1906	89 years	1995
Polio	1908	47 years	1955
Measles	1953	42 years	1995
HPV	1974	33 years	2007
Rotavirus	1973	25 years	1998
Hepatitis B	1965	16 years	1981
HIV	1983		

SOURCE: Source: AVAC AIDS Vaccine Handbook

Replication Cycle of HIV





Gender-based violence

Globally, nearly one in four women experience sexual violence by an intimate partner in their lifetimes. Further, research has found that in the United States, women in abusive relationships are four times as likely to contract HIV.

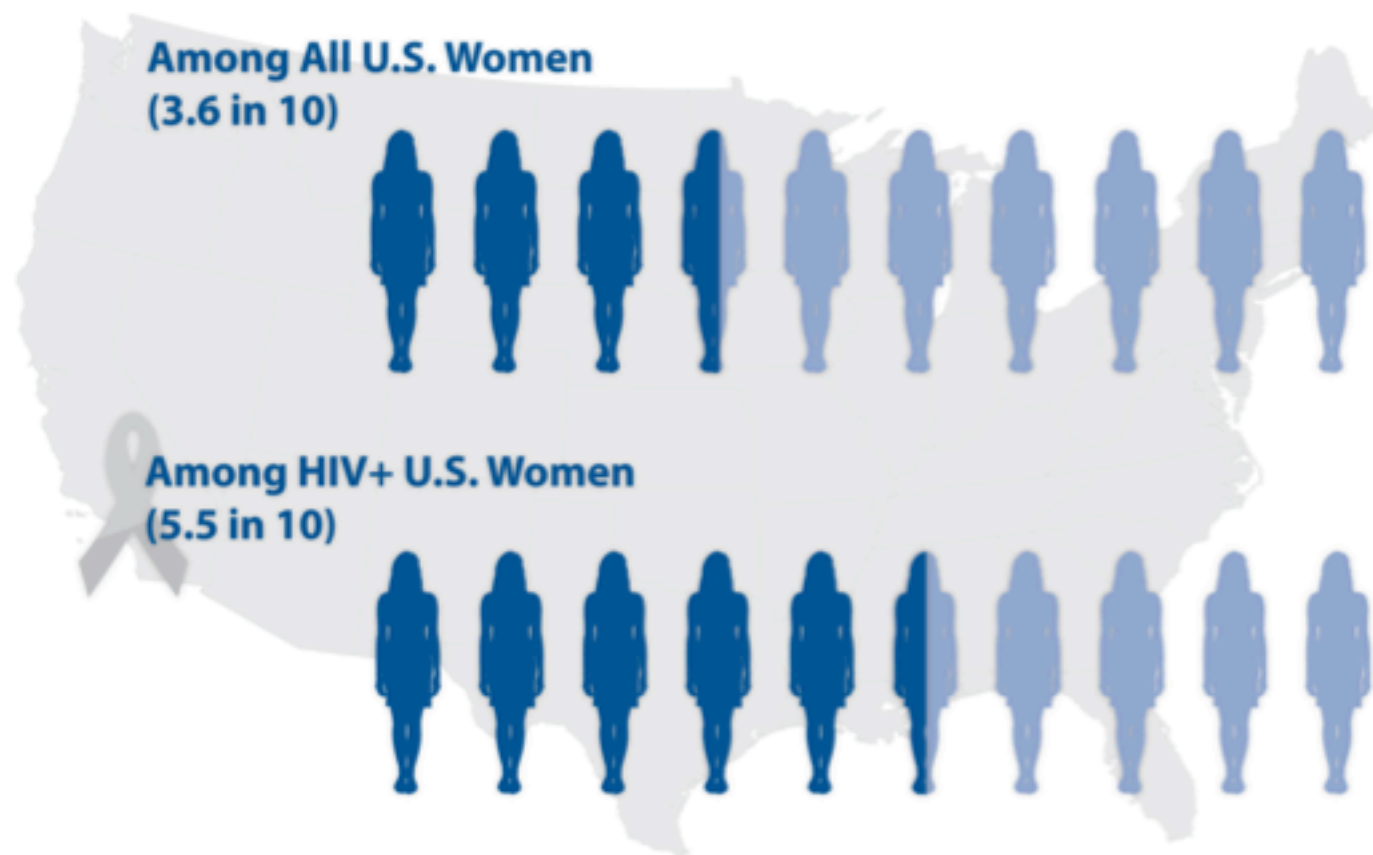
Women of color and transgender women are disproportionately impacted by HIV/AIDS and domestic violence, and often lack access to critical resources.

Black and Latina women comprise 75 percent of U.S. women living with HIV, and a recent survey of transgender women found that 58 percent had experienced domestic violence and 28 percent were HIV positive.

Gender-based violence – supported by bias, discrimination, and disenfranchisement – lies at the center of the intersection between HIV/AIDS and abuse. Abusers use physical and sexual violence to control their partners.

Experience of Intimate Partner Violence and Women, Overall and with HIV

Lifetime Experience of Intimate Partner Violence (IPV)



Source: Matthew J. Breiding, Jieru Chen, and Michele C. Black. National Center for Injury Prevention and Control, Centers for Disease Control and Prevention. The National Intimate Partner and Sexual Violence Survey: Intimate Partner Violence in the United States — 2010. Atlanta, GA, 2014.; Machtiger, E.L., et al. (2012) Psychological Trauma and PTSD in HIV-Positive Women: A Meta-Analysis. *AIDS and Behavior*. 16(8): 2091-2100.

African American women are also disproportionately impacted by HIV-AIDS with infection rates more than 20x the rate for white females, and account for 66% of all new AIDS cases in women. In recent years, BV has been significantly associated with increased incidence of HIV infection.

There is a health disparity for both **bacterial vaginosis (BV)** and **human immunodeficiency virus type (HIV-1)** infection in African American women that may be linked.

Analyses performed by Atashili et al. suggest that BV increases the risk for HIV-1 acquisition by 60%.

The epidemiologic synergy between the two infections as well as the biologic basis for this synergy.

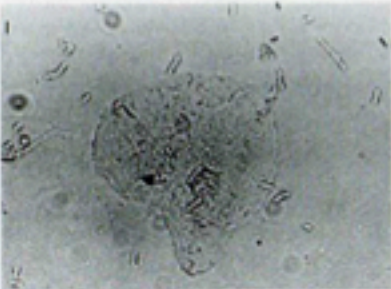
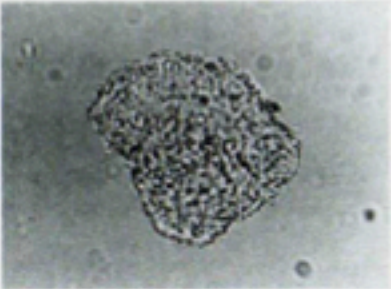
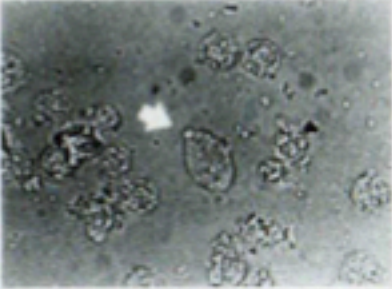
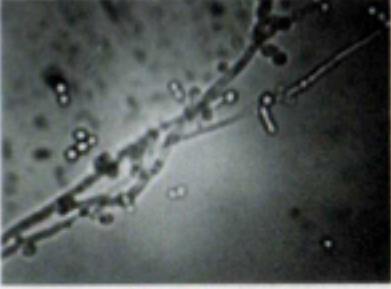
1. Centers for Disease Control (CDC). *HIV/AIDS Surveillance Report, 2005*. Vol. 17. Rev ed. Atlanta: US Department of Health and Human Services, CDC. 2007: 1-46.
2. Martin HL, Richardson BA, Nyange PM, Lawreys L, Hillier SL, Chohan B, Mandalisa K, Ndinya-Achola JO, Bwayo J, Kreiss J. Vaginal lactobacilli, microbial flora, and risk of human immunodeficiency virus type 1 and sexually transmitted disease acquisition. *J Infect Dis*. 1999; 6:1863-1868.
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4. Taha TE, Gray RH, Kumwenda NI, Hoover DR, Mtimavaiye LA, Liomba GN, Chipangwi JD, Dallabetta GA, Motti PG. HIV infection and disturbances of vaginal flora during pregnancy. *J Acquir Immune Defic Syndr Hum Retroviro*. 1999; 1:52-59.
5. Taha TE, Hoover DR, Dallabetta GA, Kumwenda NI, Mtimavaiye LA, Yang LP, Liomba GN, Broadhead RL, Chipangwi JD, Motti PG. Bacterial vaginosis and disturbances of vaginal flora: association with increased acquisition of HIV. *AIDS*. 1998; 13:1699-1706.
6. Cohen CR, Duerr A, Pruthithada N, Ruggao S, Hillier S, Garcia P, Nelson K. Bacterial vaginosis and HIV seroprevalence among female commercial sex workers in Chiang Mai, Thailand. *AIDS*. 1995; 9:1093-1097.
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Bacterial vaginosis (BV)

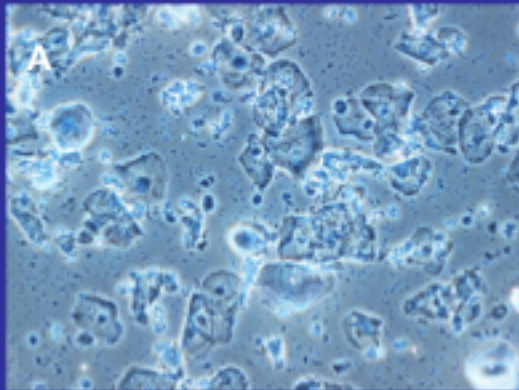
There is a health disparity for both bacterial vaginosis (BV) and human immunodeficiency virus type 1 (HIV-1) infection in African American women that may be linked. The evidence that BV predisposes women to higher risk for HIV infection is well documented. The underlying mechanisms to support the epidemiological connections will require further investigations.

Bacterial vaginosis (BV) is a common vaginal disorder in women first reported by Gardner and Dukes in 1955. In women of childbearing age, BV is the most common cause of vaginitis and has also been associated with fetal loss, chorioamnionitis, cervicitis, endometritis, urinary tract infections, cervical intraepithelial neoplasia, pelvic inflammatory disease (PID), preterm labor, and delivery of low birth weight infants. BV occurs in nearly 29% of 14- to 49-year-old women in the United States (~21 million women)

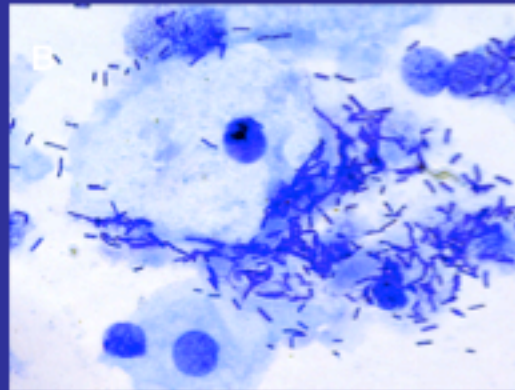
Risk factors for BV include: douching, vitamin D deficiency, STI, psychological stress, inflammatory cervicovaginal communities

Diagnostic Criteria	Normal	Bacterial Vaginosis	<i>Trichomonas</i> Vaginitis	<i>Candida</i> Vulvovaginitis
Vaginal pH	3.8 - 4.2	> 4.5	> 4.5	< 4.5 (usually)
Discharge	White to clear, flocculent	Thin, homogeneous, white or gray, adherent, often increased	Yellow-green, frothy, adherent, increased	White, curdy, "cottage cheese"- like, sometimes increased
Amine odor (KOH whiff test)	Absent	Present (fishy)	May be present (fishy)	Absent
Primary Symptoms	None	Discharge, bad odor (may be worse after intercourse), possible itching/burning	Frothy discharge, bad odor, vulvar pruritus, dysuria	Itching/burning, discharge
Microscopic Appearance	 <p>Lactobacilli, epithelial cells</p>	 <p>Clue cell with adherent coccoid bacteria, no WBCs</p>	 <p>Trichomonad (arrow), WBCs >10/hpf</p>	 <p>Budding yeast, hyphae, pseudohyphae (w/KOH prep)</p>

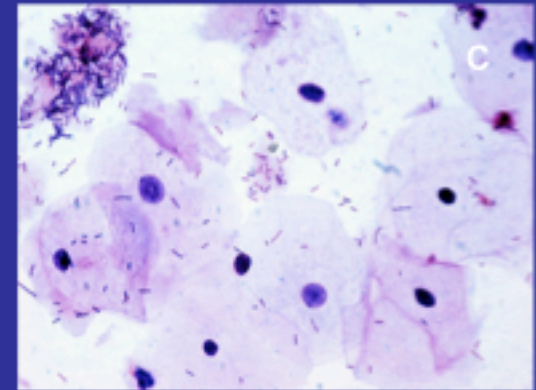
Wet mount BV- /VL5



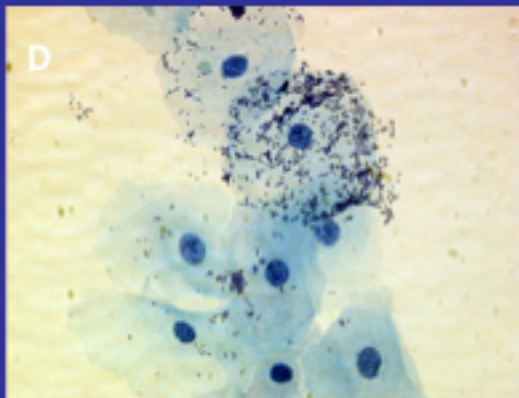
Crystal violet stain BV- /VL5



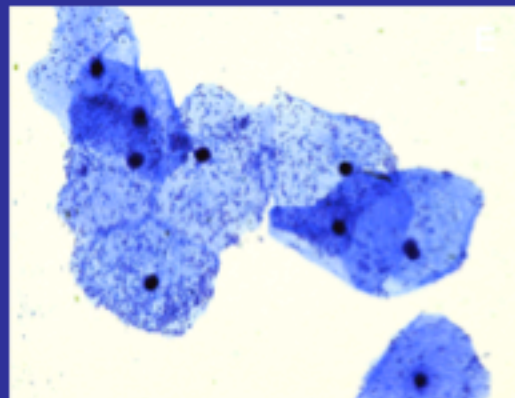
Gram stain BV- /VL5



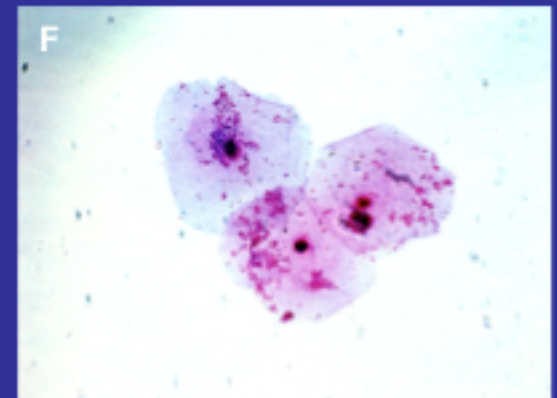
Crystal violet stain BV+ /VL2



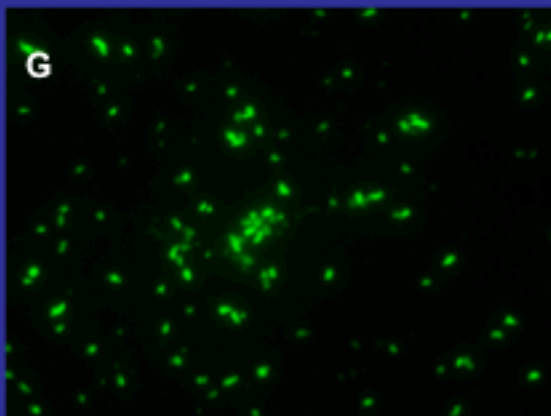
Crystal violet stain BV+ /VL6



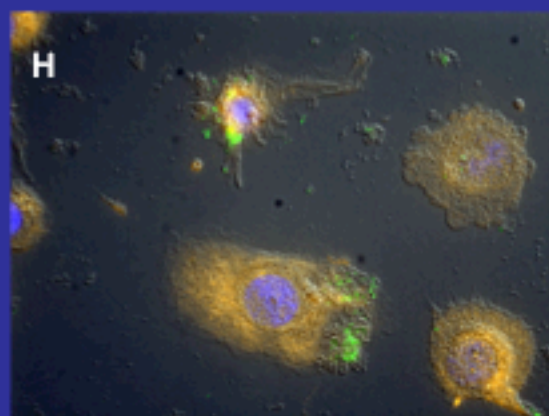
Gram stain Clue Cells BV+ /VL4



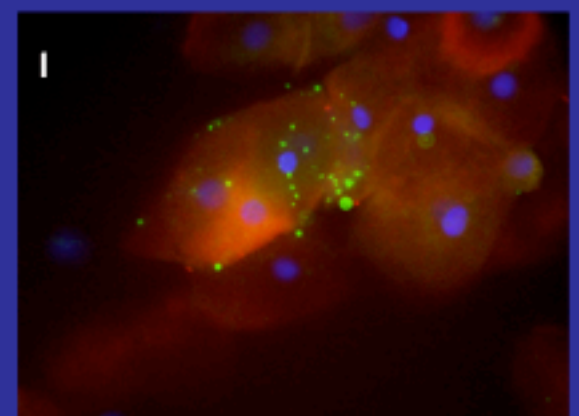
IFA G. vaginalis, Serotec Mab



VK2 Infected G. vaginalis



VL4 BV+ /ERBeta (Rho) + G.v. (FITC)



BACKGROUND: Bacterial Vaginosis

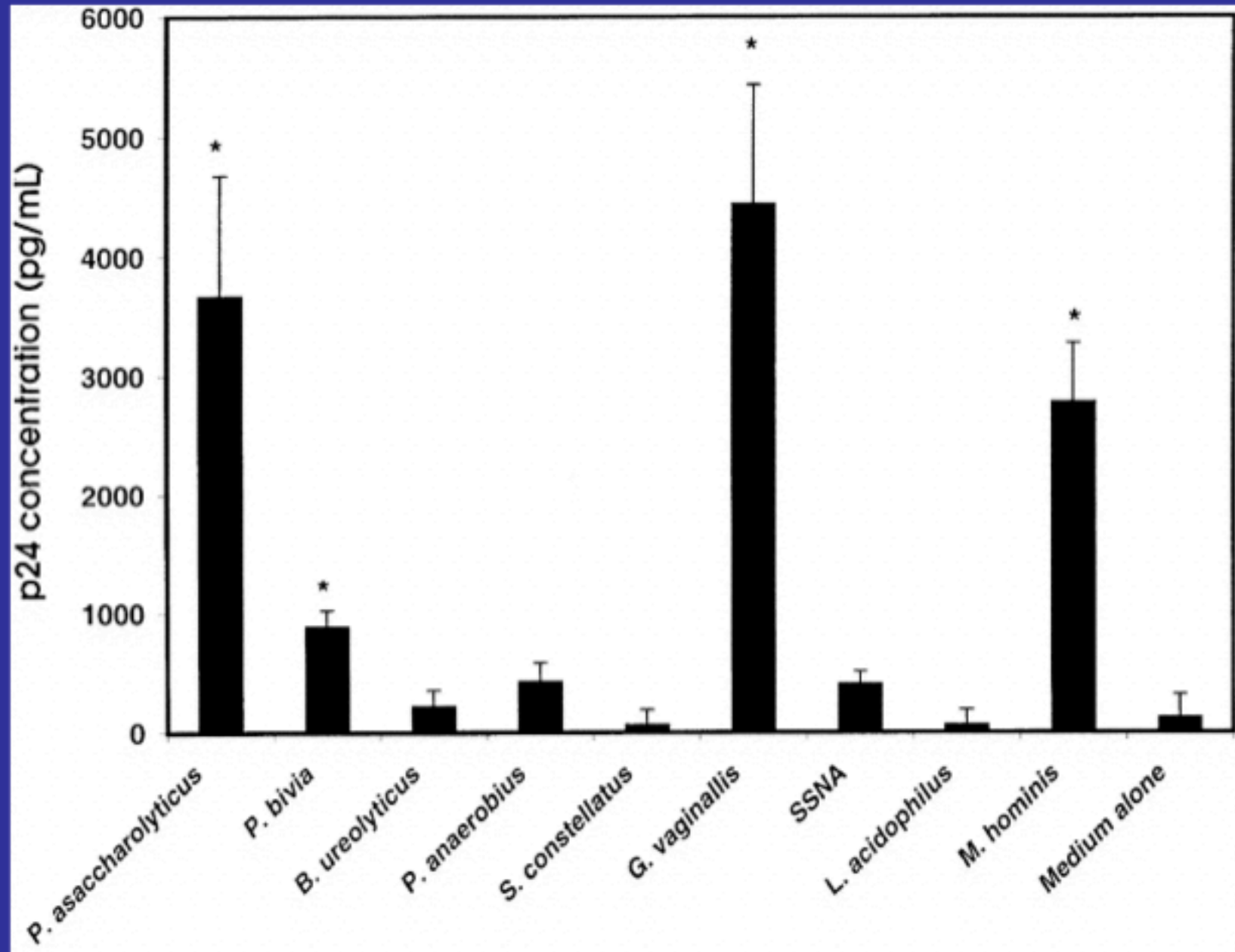
- 40-50% of all vaginal Infection are associated with BV
- The rate of BV infection in pregnant women in the US is 15-20%
- BV has been associated with Chorioamionitis PID, Preterm labor and delivery of low birth weight infants, Postpartum infection, and HIV-1 acquisition
- Africa American women have incidence of BV than other major ethnic groups

BV and Associated Risks for HIV-1 Acquisition

- Cohen et al., 1995, AIDS (BV associated with HIV seropositivity)
- Sewankambo et al., 1997, Lancet (HIV infection associated with abnormal vaginal flora and BV)
- Taha et al., 1998, AIDS (BV associated with increased risks for HIV-1 acquisition)
- Martin et al., 1999, JID (Abnormal vaginal flora associated with increased risk for HIV-1 acquisition)



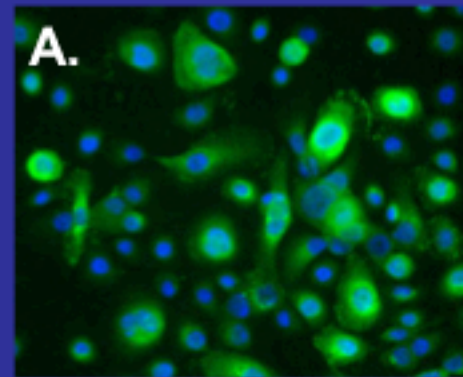
Induction of HIV-1 Expression by Anaerobes Associated with Bacterial Vaginosis



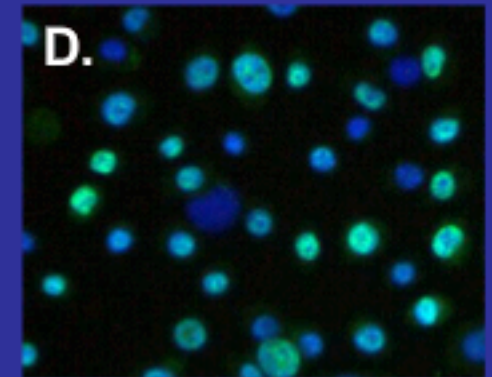
VK2 Cell Biomarkers

Cytoskeletal	Fibronectin	+
	Alpha actin	--
	Vimentin	+
	Beta Catenin	+
Cellular Adhesion	PECAM-1	--
	VCAM-1	--
	ICAM-1	--
	MeICAM-1	--
	E selectin	--
	VE Cadherin	--
	VWF	--
	Alpha 4 Int	--
Proliferation	Ki67	+
Functional	Epithelial specific-Ag	+
	Estrogen Receptor-B	+

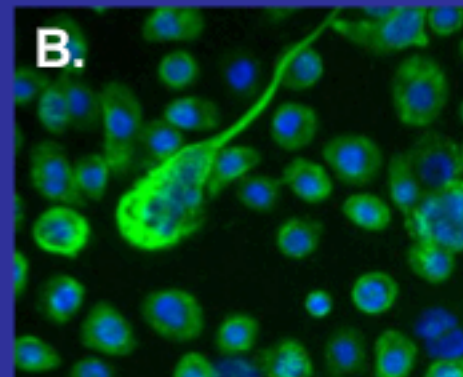
Fibronectin



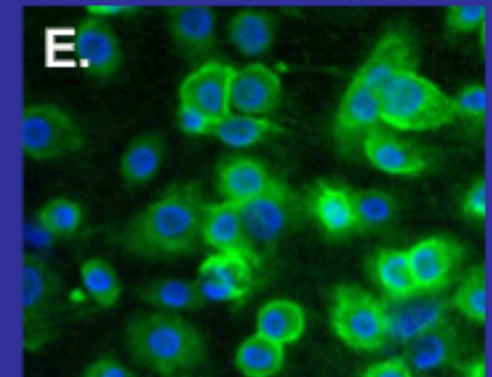
Ki67



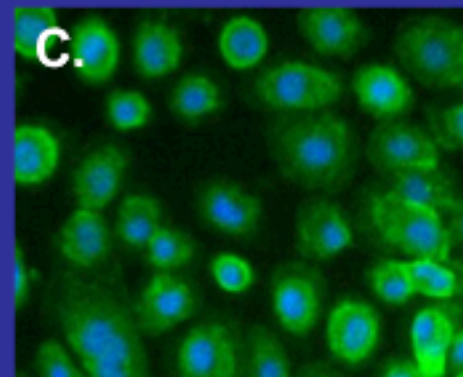
Vimentin



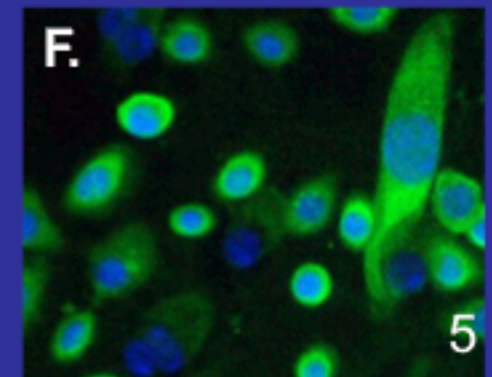
ESA



Beta catenin



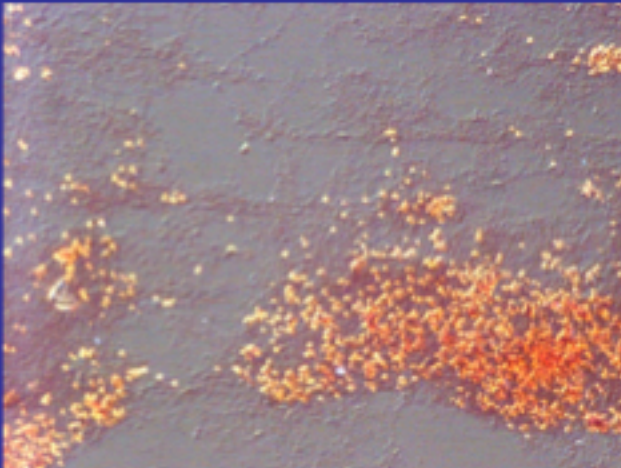
ER-beta



Gardnerella Vaginalis ATCC 14018

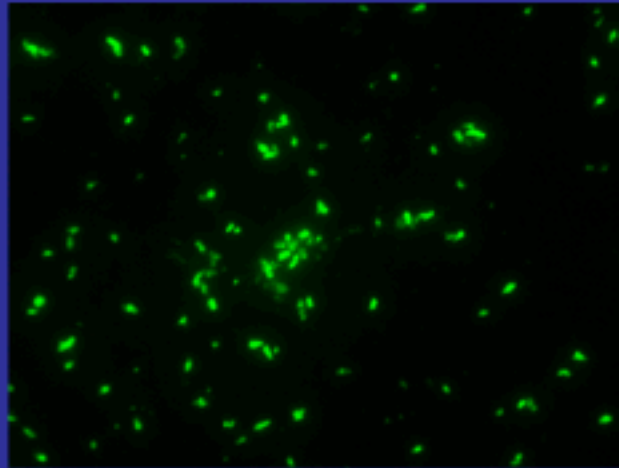
A.

G. Vaginalis Gram stain 600X

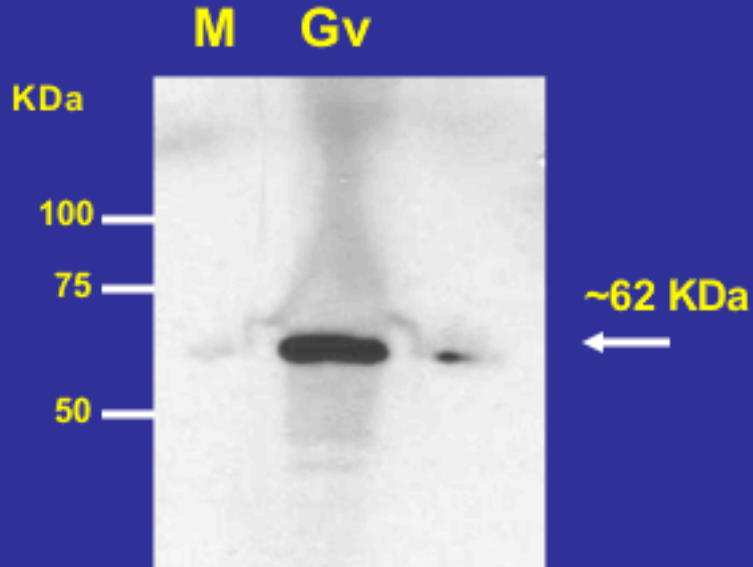


B.

G. Vaginalis Mab (FITC) 900X



C. *Gv.* Monoclonal antibody from Serotec



A western blot of *G. Vaginalis* proteins using a monoclonal antibody from Serotec (Biogenesis) clone 1051/109 at 1:2000 dilution

Lab Cultivation

ATCC (lyophilized sample)



Resuspension in Thyglycollate



Thiogly.

Chocolate Agar
(CO₂ gas pack)



Incubation at 37C (3-5% CO₂)



Colonies



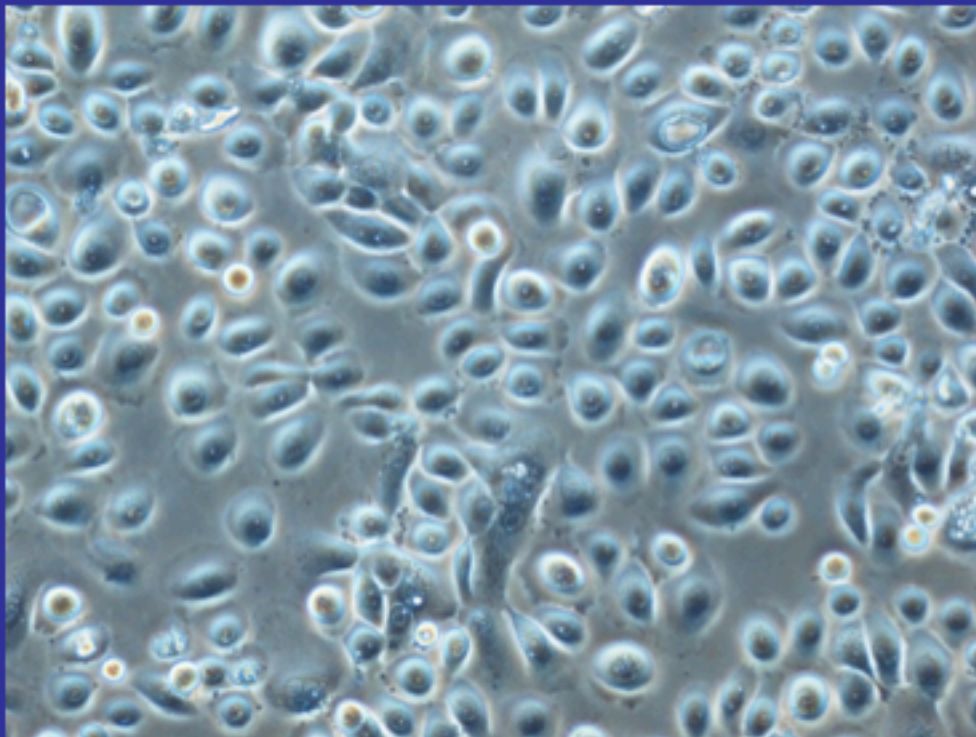
BHI Broth
Sup. 10% HS
and 1% Glucose

D. O₂ requirements

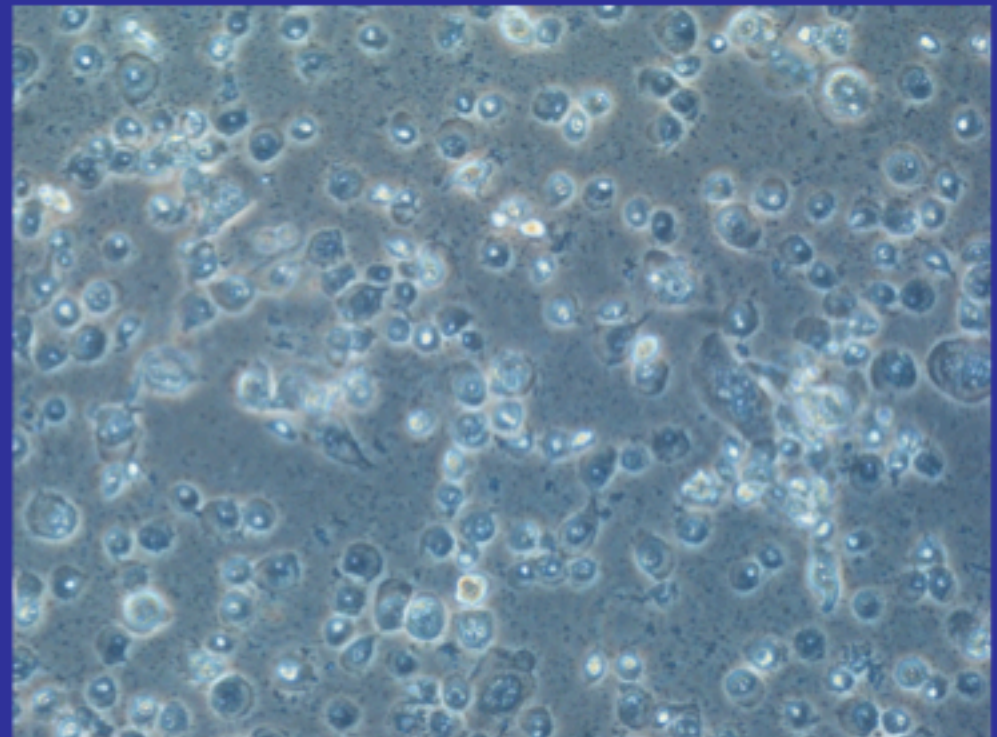


Phase Contrast Microscopy of Vaginal Epithelial Cells Exposed to *Gardnerella Vaginalis* for 24 hours

Mock Infected control



***G. vaginalis* Infected**

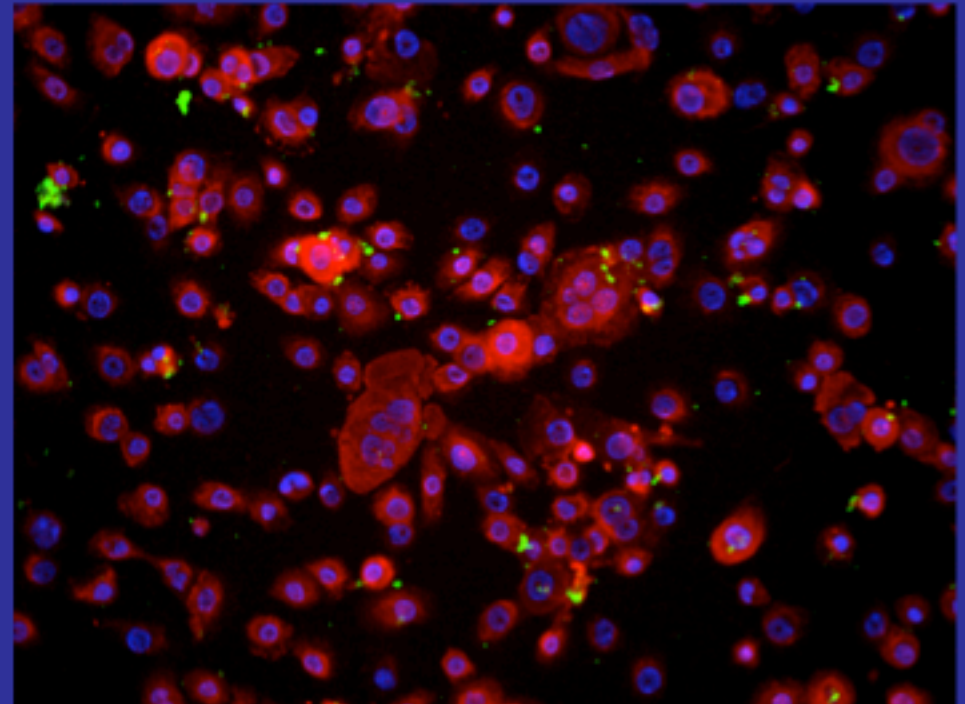
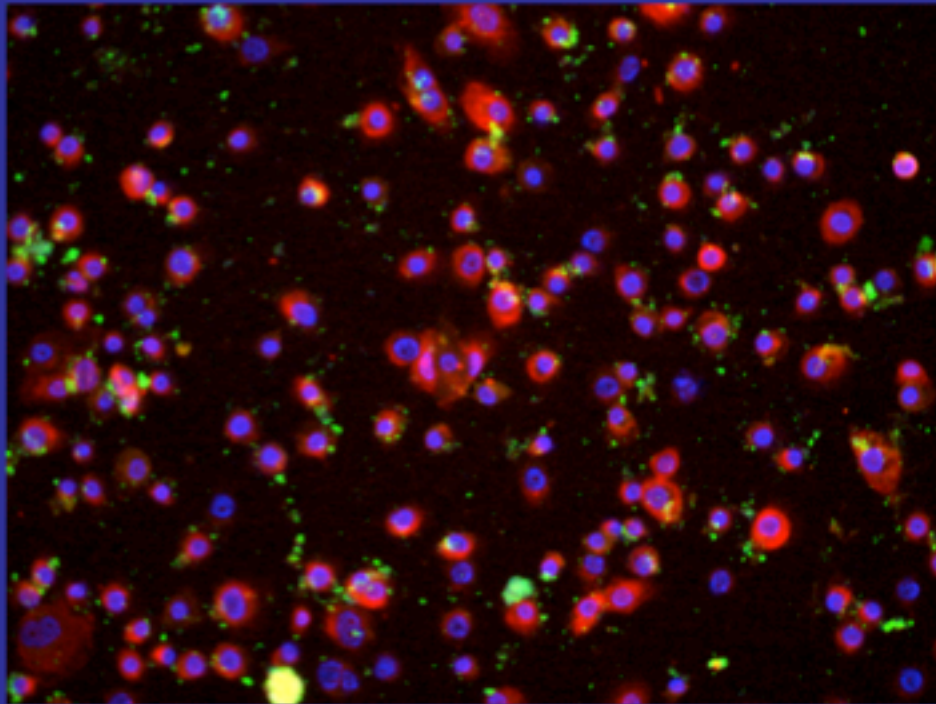


Vaginal epithelial cells at 80% confluence was infected with *G. vaginalis* and cells were analyzed for morphological changes by phase microscopy. Images were taken on Nikon TE 2000S microscope mounted with a CCD camera at 200X total magnification

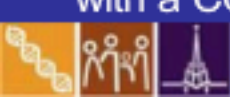


Vaginal Epithelial Cells Infected with *G. vaginalis* Expressing Estrogen Receptor Beta (Rhodamine) and the *G. Vaginalis* 62 KDa Protein (FITC)/Mab Serotec (Biogenesis)

VECs stained for Estrogen Receptor Beta and *G. vaginalis*



Vaginal Epithelial cells at 80% confluency were infected with *G. vaginalis* in chamber slides. *G. Vaginalis* was cultured in 10 ml of thioglycolate media at 37C for 48 hours and later cells pelleted by centrifugation at 1500 rpms for 5 minutes, washed twice with PBS then resuspended in 1 ml of fresh PBS and 200 ul of the *G. vaginalis* suspension was added to each well of the chamber slide. Infected cells on slides were fixed in methanol at 24, 48 and 72 hours post infection. Cells were dual stained by IFA for expression of the estrogen receptor beta (ER-b) and the 62 KDa *G. vaginalis* protein with a Rb polyclonal antibody to ER-b at 1:100 and the Serotec Mab to *G. vaginalis* at 1:50. VEC were maintained in Keratinocyte SFM complete media supplemented with 0.4 mM Ca²⁺. Photographs were taken on a Nikon TE200S microscope mounted with a CCD camera at a total magnification of 200X.

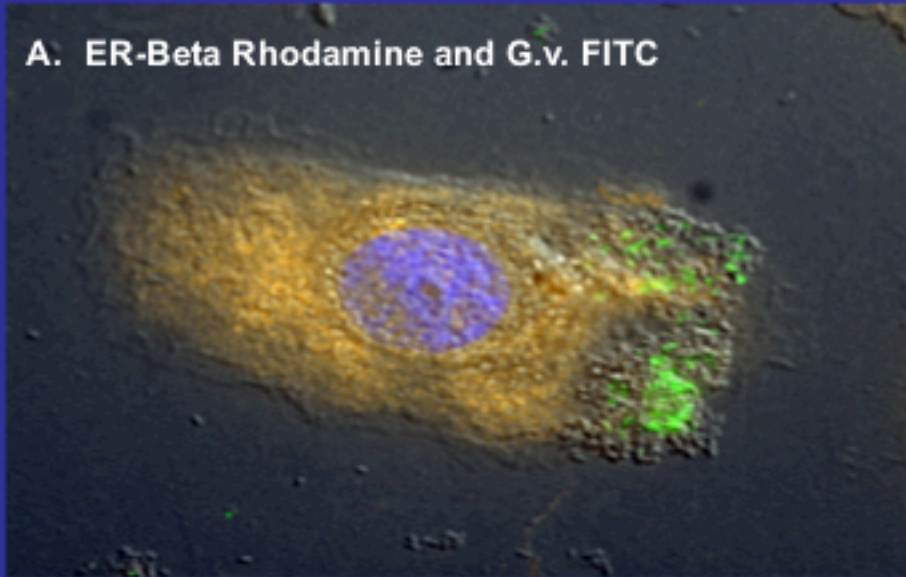


**Microarray Results from Vaginal Epithelial Cells Exposed to *G. vaginalis* for 1 hour
Representing the Highest Fold Change in Transcription Compared to Mock Infected
Control Cells**

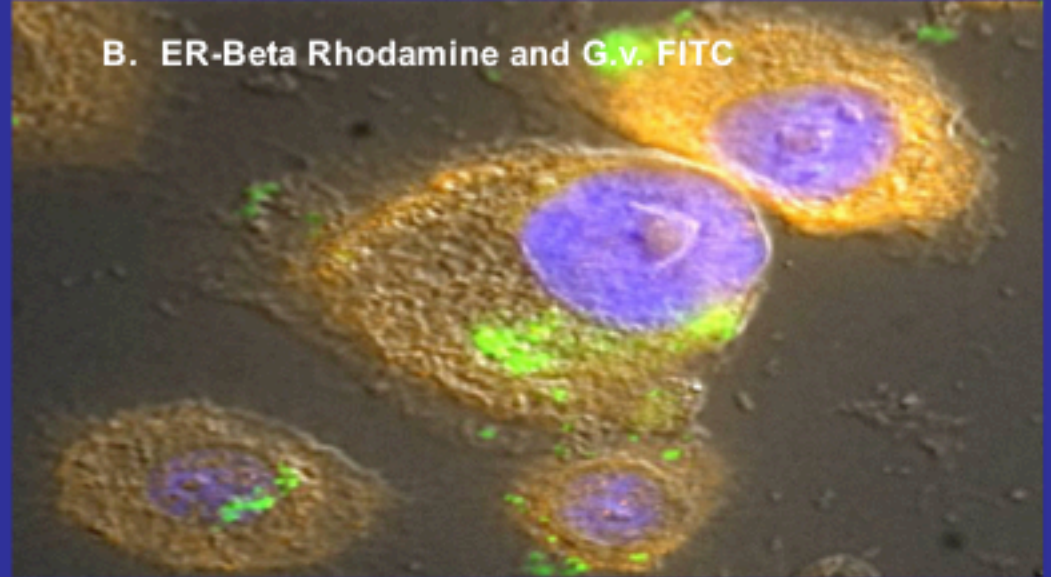
Gene Up-regulated	Fold Change	Gene Down regulated	Fold Change
TNFalpha	765	Urotensin	105
CXCL2	90	ABL2	78
IL6	87	Cyclin M2	60
Pentraxin	76	Tetraspinin 12	57
FC Receptor-4	57	GPR55	51
Pleckstrin	52	Contactin-3	50
VCAM-1	49	SNAP25	50
Protocadherin	43	Desmin	43
SOD	41	Prolactin	42
IL8	39	TGFB2	37

G. vaginalis infection of VEC cells Showing Evidence of Uptake

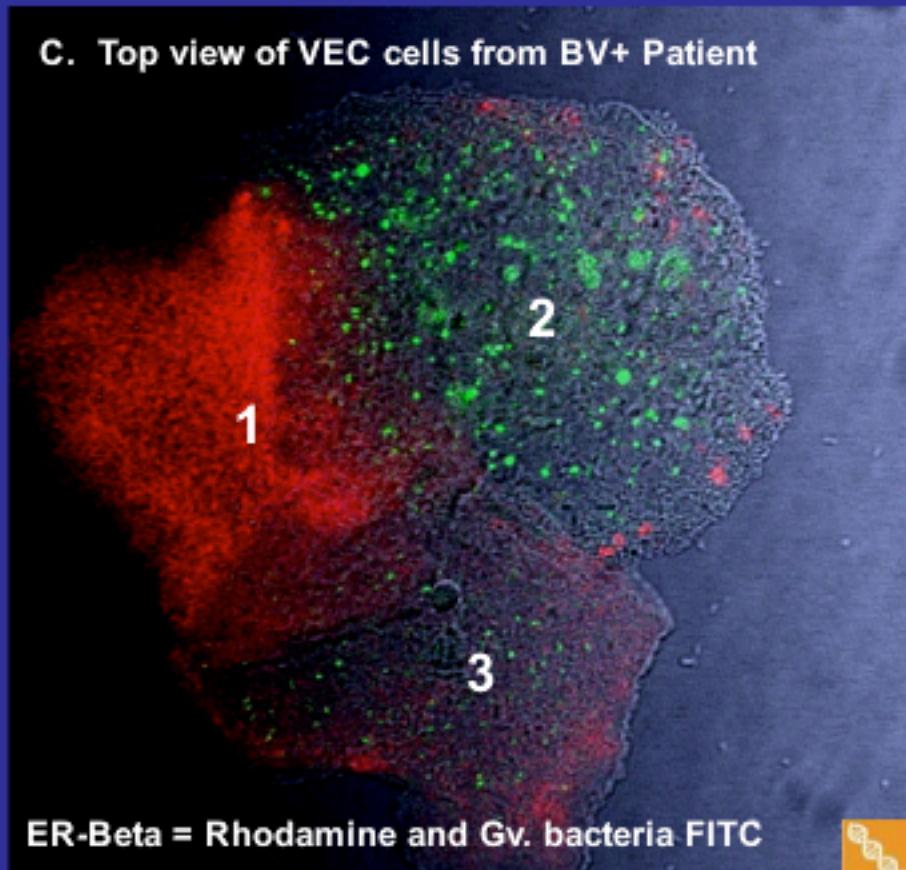
A. ER-Beta Rhodamine and G.v. FITC



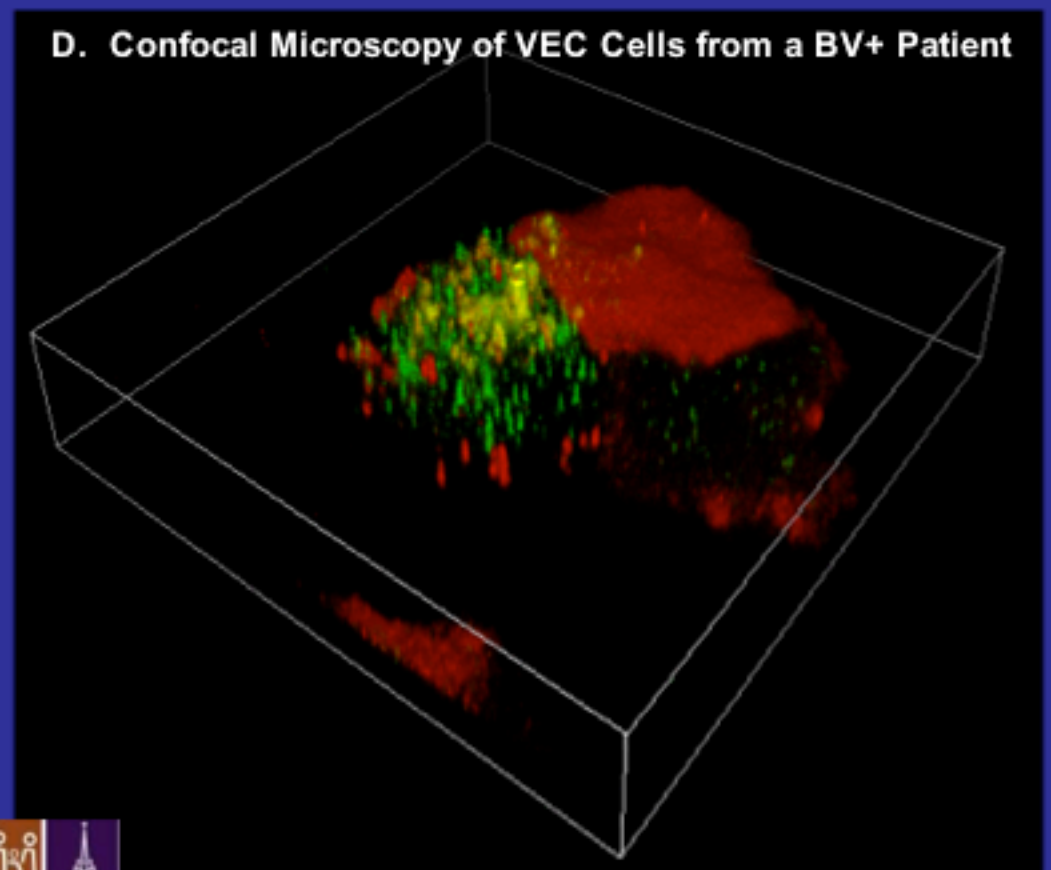
B. ER-Beta Rhodamine and G.v. FITC



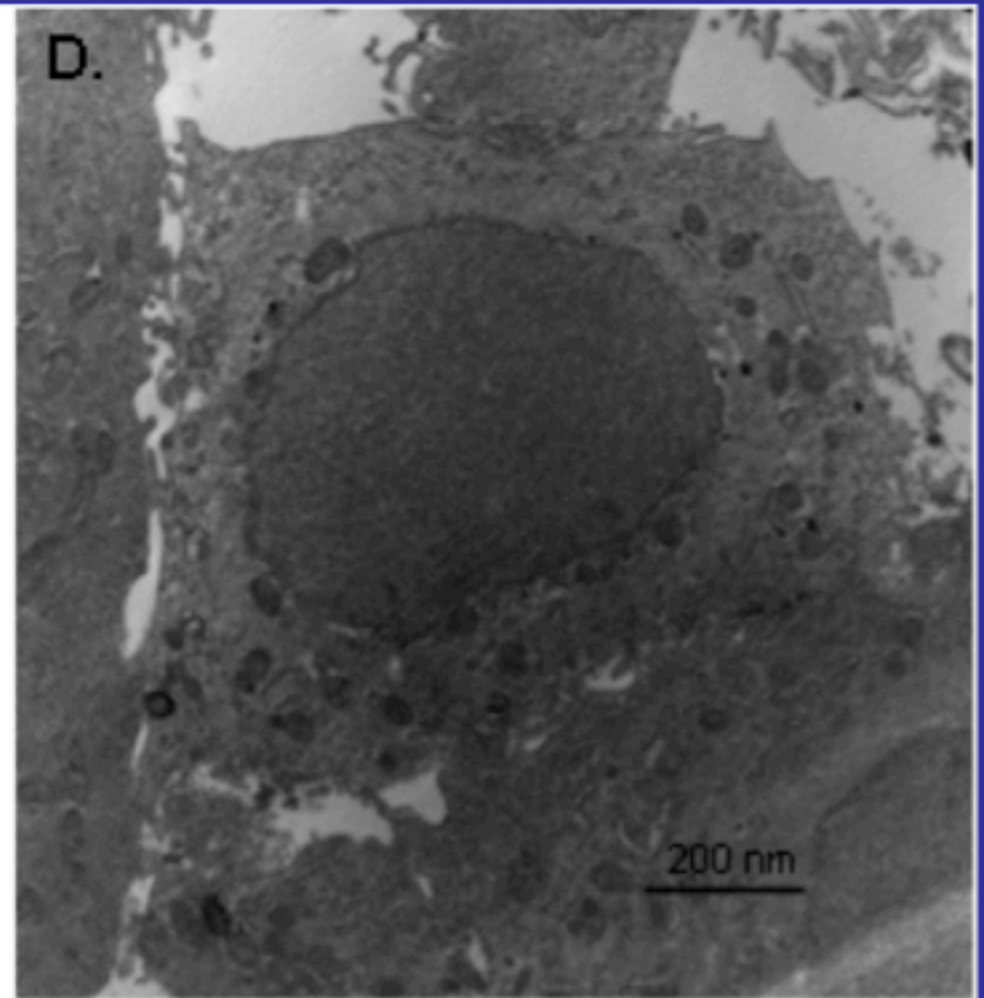
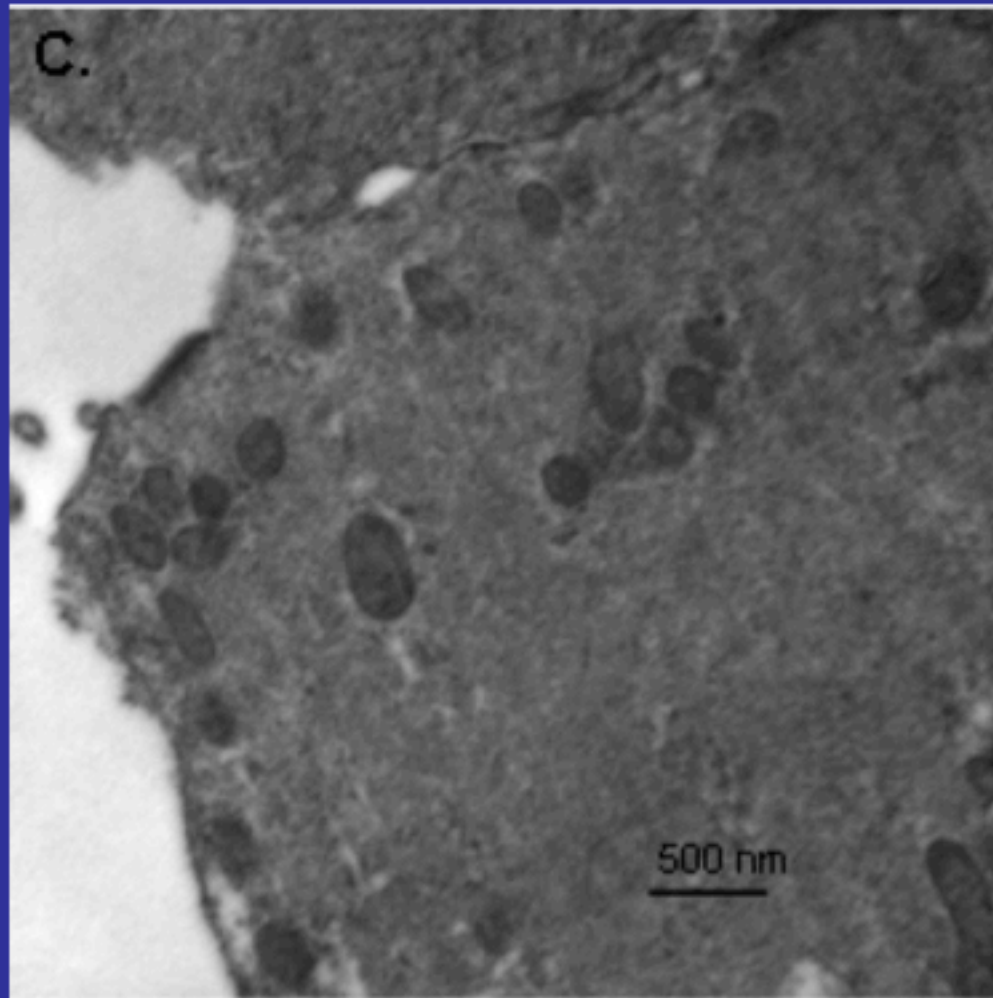
C. Top view of VEC cells from BV+ Patient



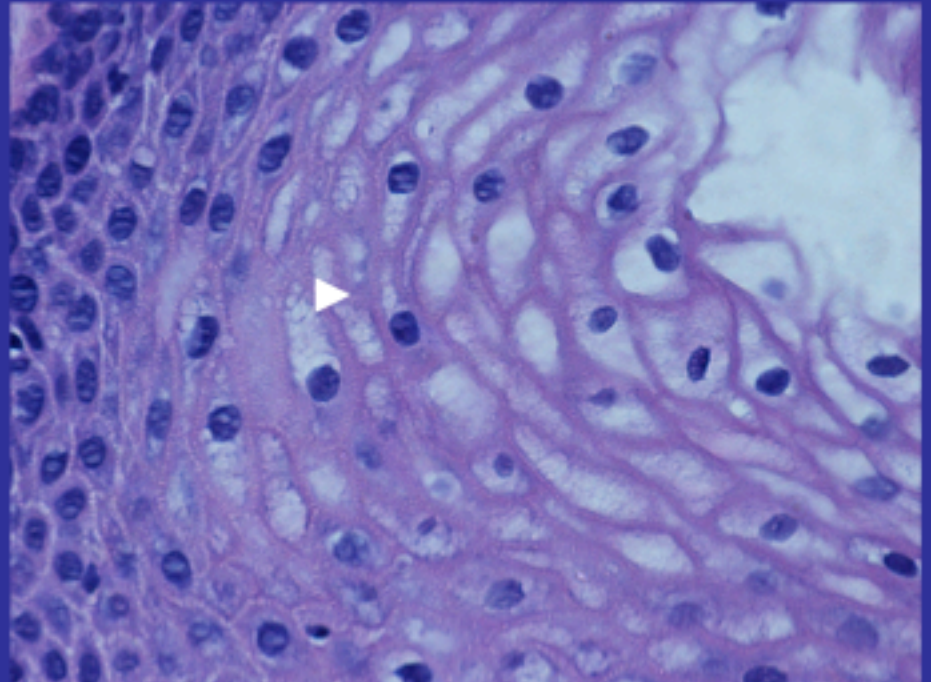
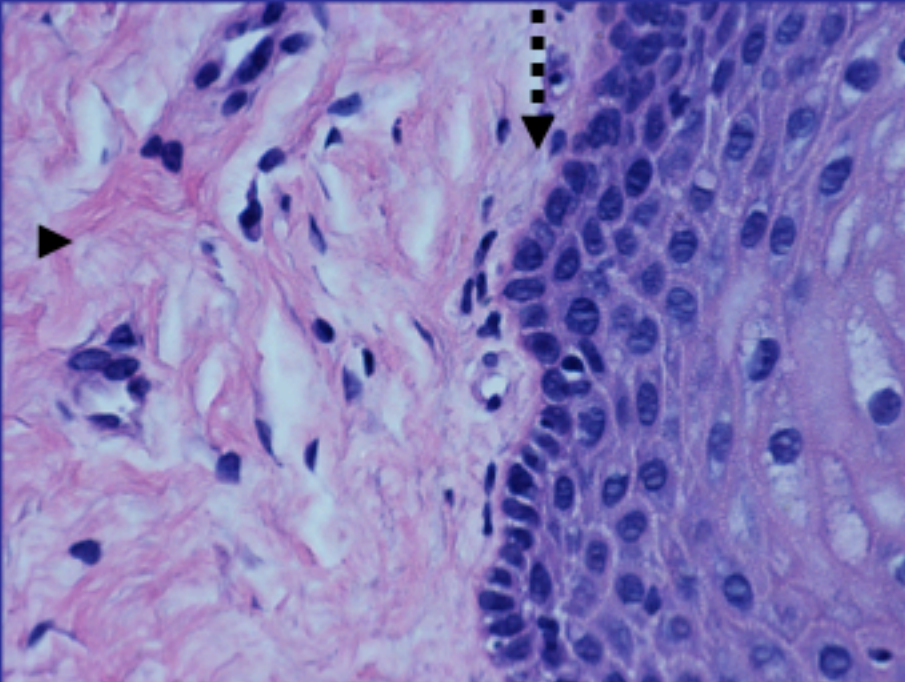
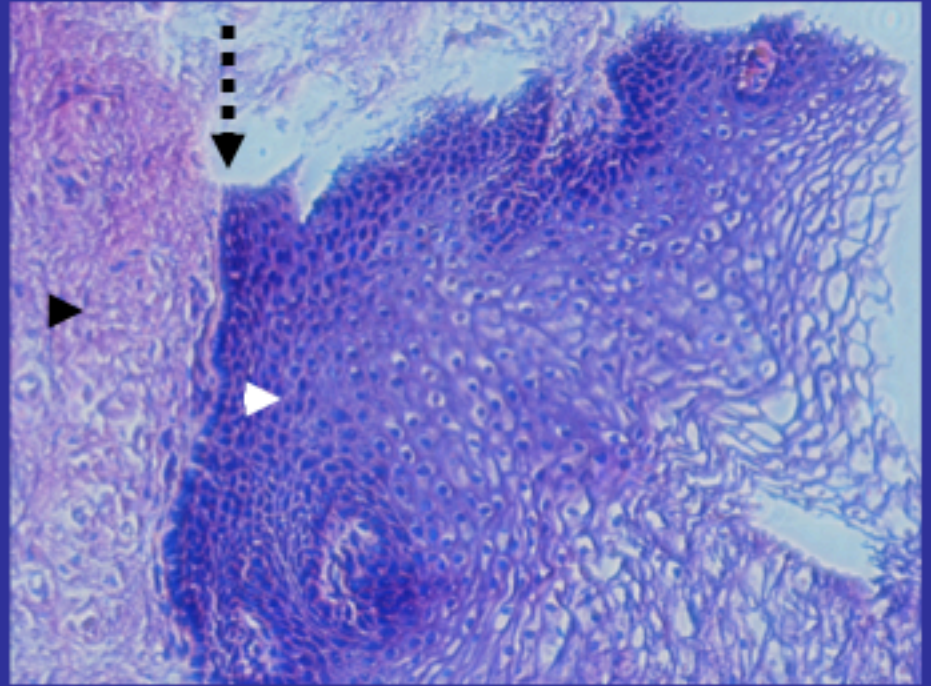
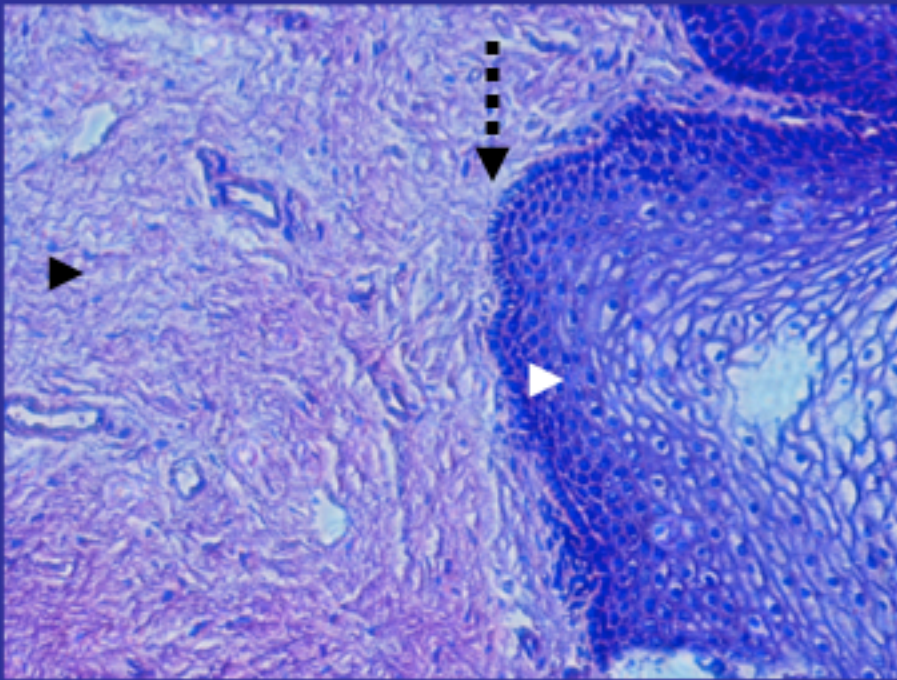
D. Confocal Microscopy of VEC Cells from a BV+ Patient



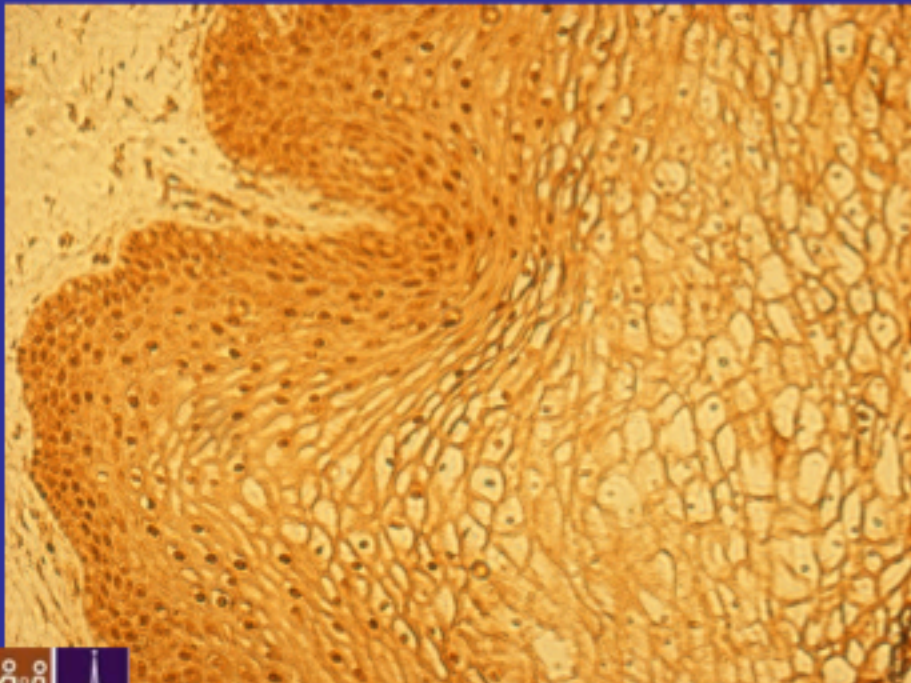
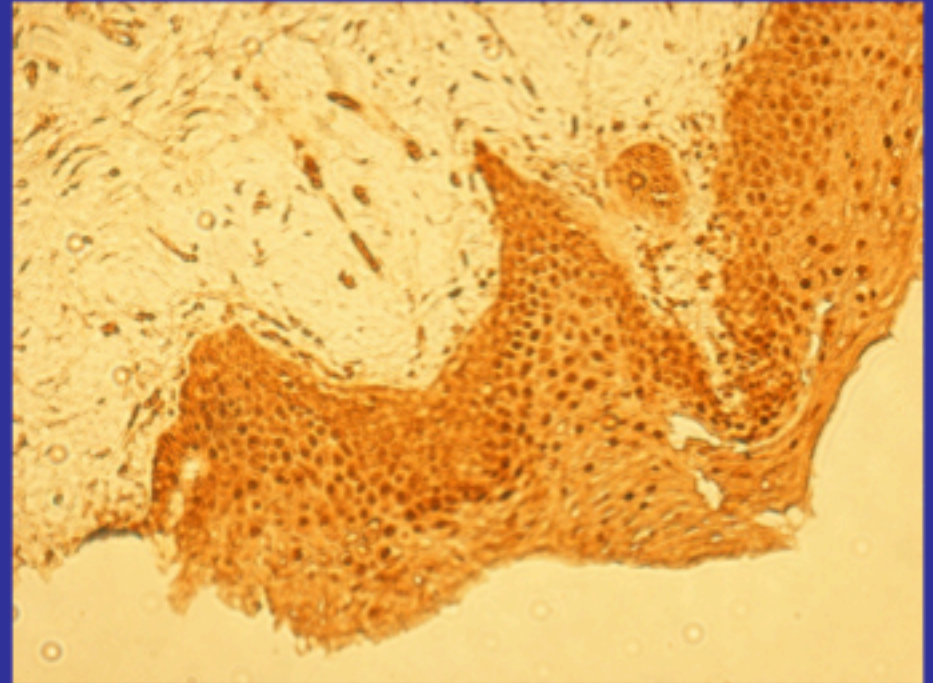
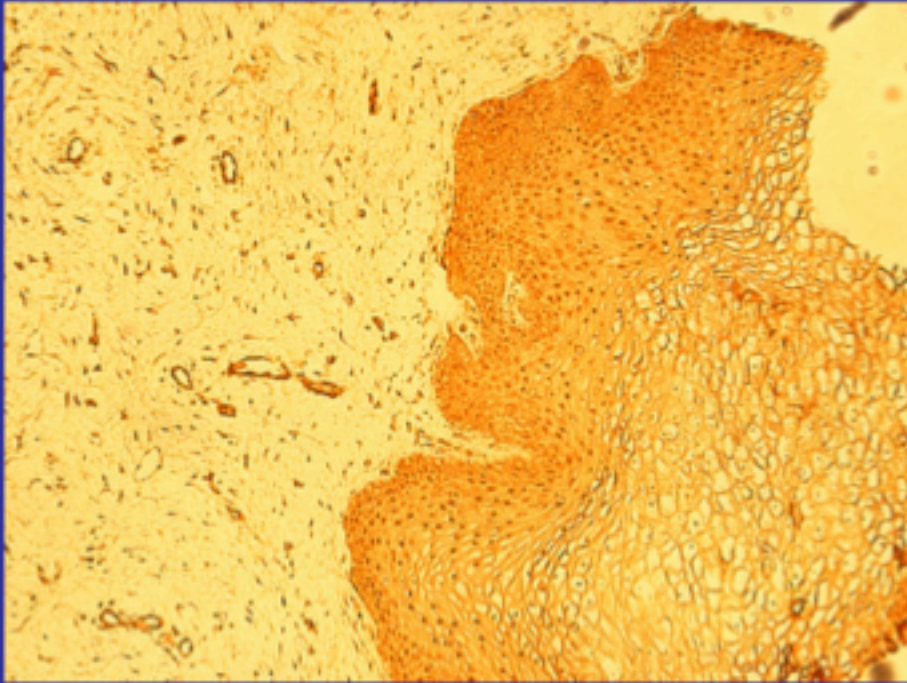
G. vaginalis in the Cytoplasm of VEC cells



H&E of Normal Vaginal Epithelial Explanted Tissue (VET-1) Formalin Fixed and Paraffin Embedded Showing Normal Squamous VEC and Submucosa

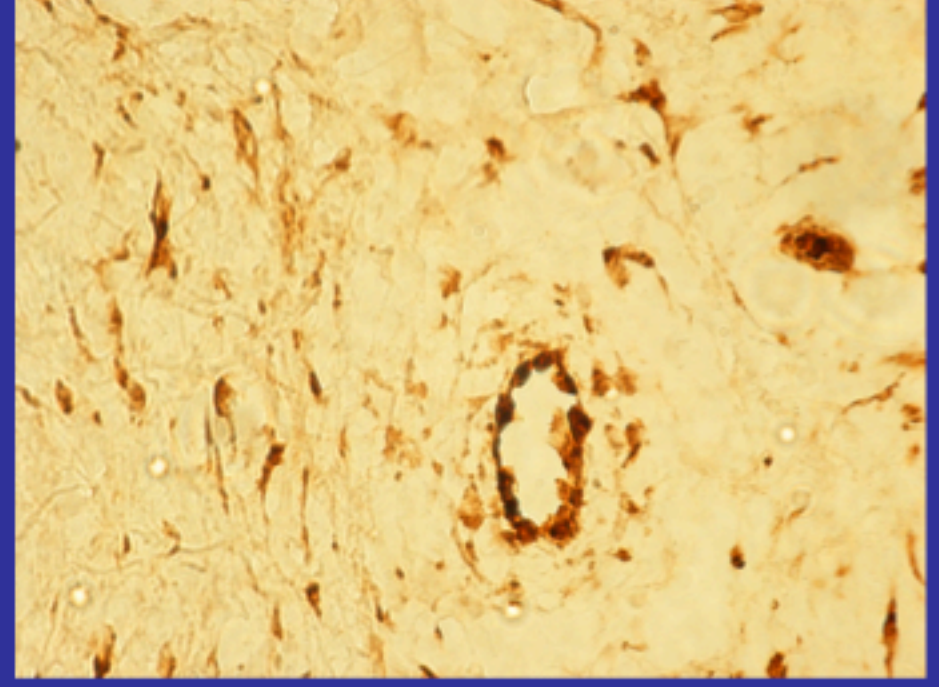
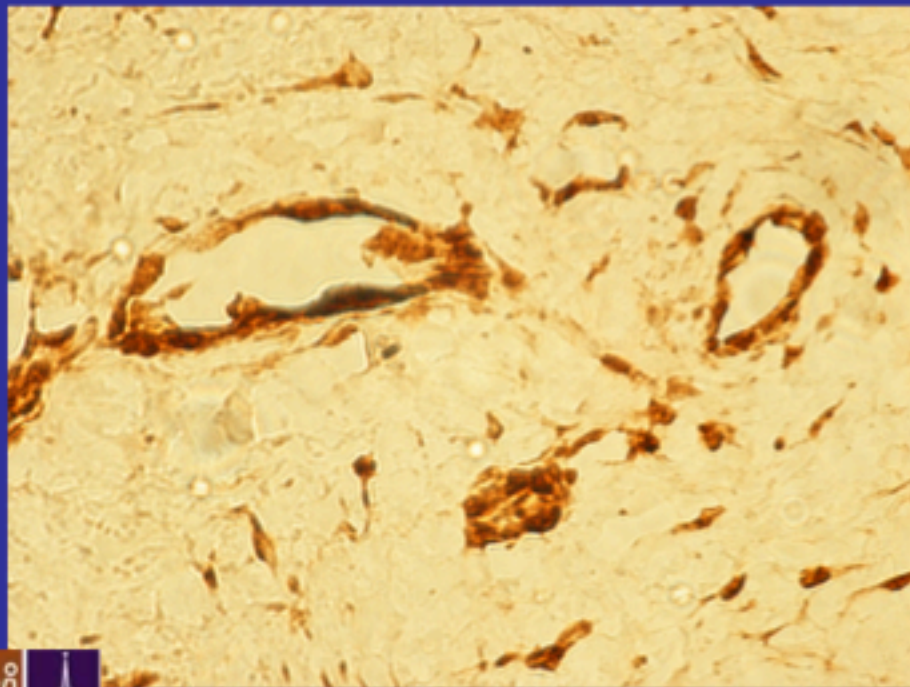
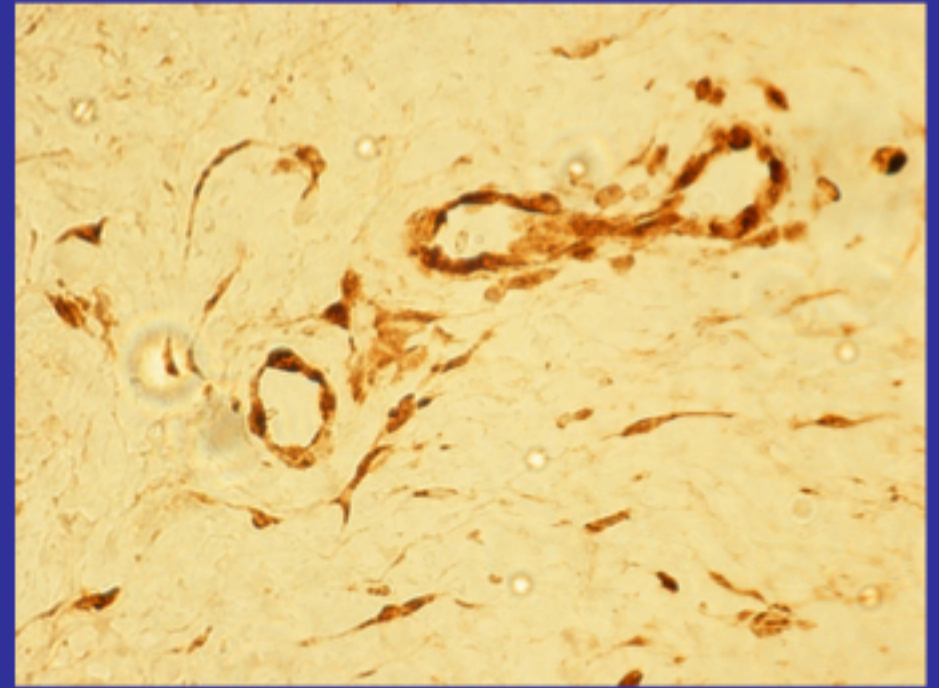
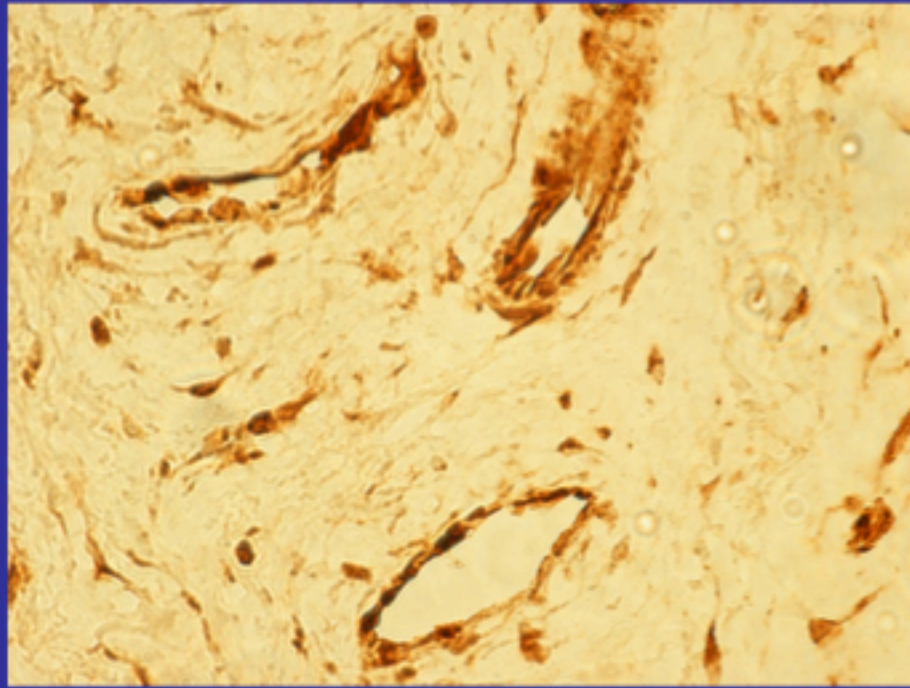


IHC for Estrogen Receptor Beta on Vaginal Epithelium from Patient VET-1

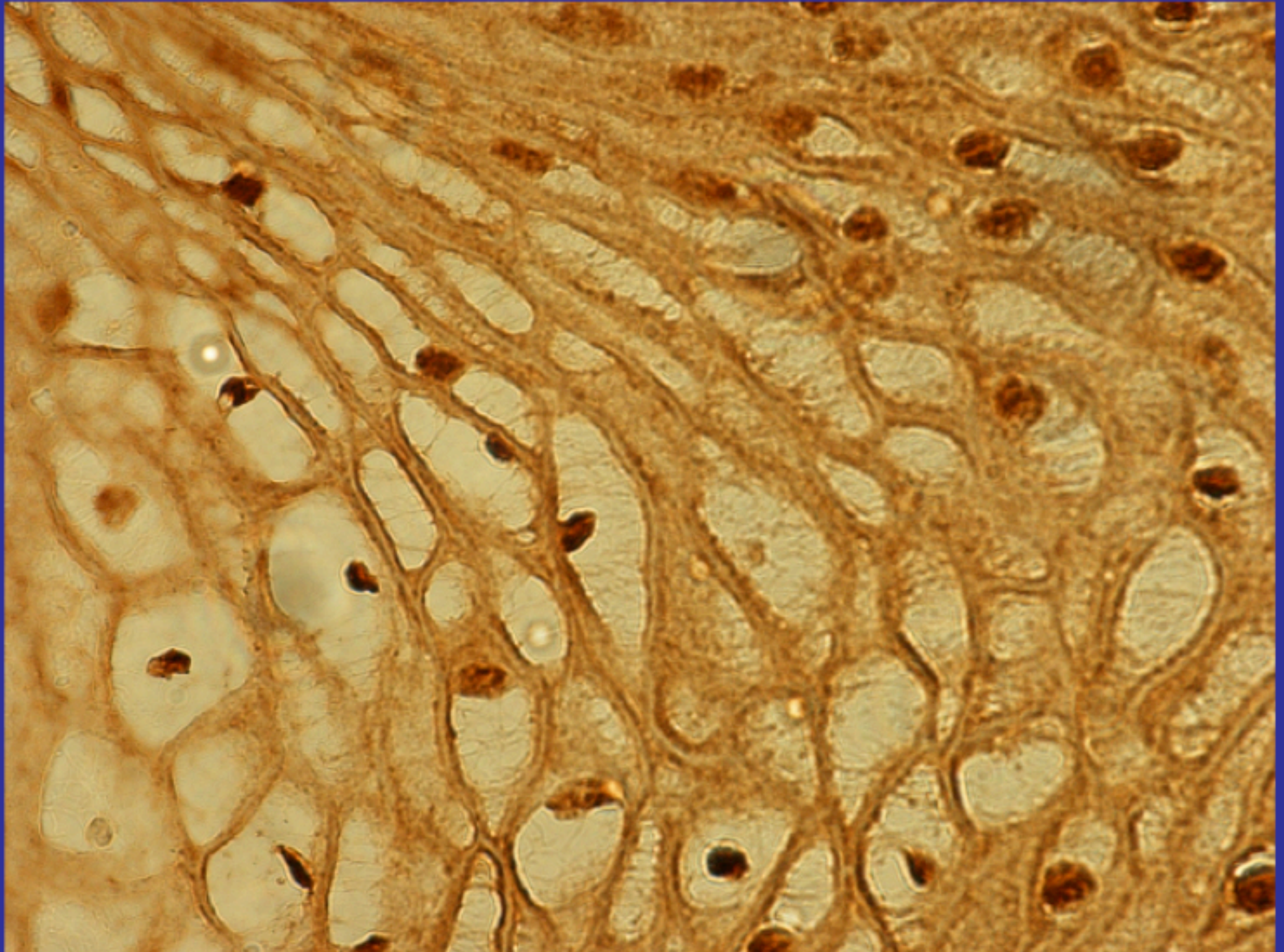


Vaginal explants were obtained from a pelvic surgery performed on a 46 year old pre-menopausal Hispanic female *(VET-1) at Metro-General Hospital in Nashville. Tissue specimens were formalin fixed and paraffin embedded. Sections (5 microns) were stained by IHC with a rabbit polyclonal antibody to human estrogen receptor beta (ER-B). Photographs were with with a Nikon TE2000S microscope at 100X.

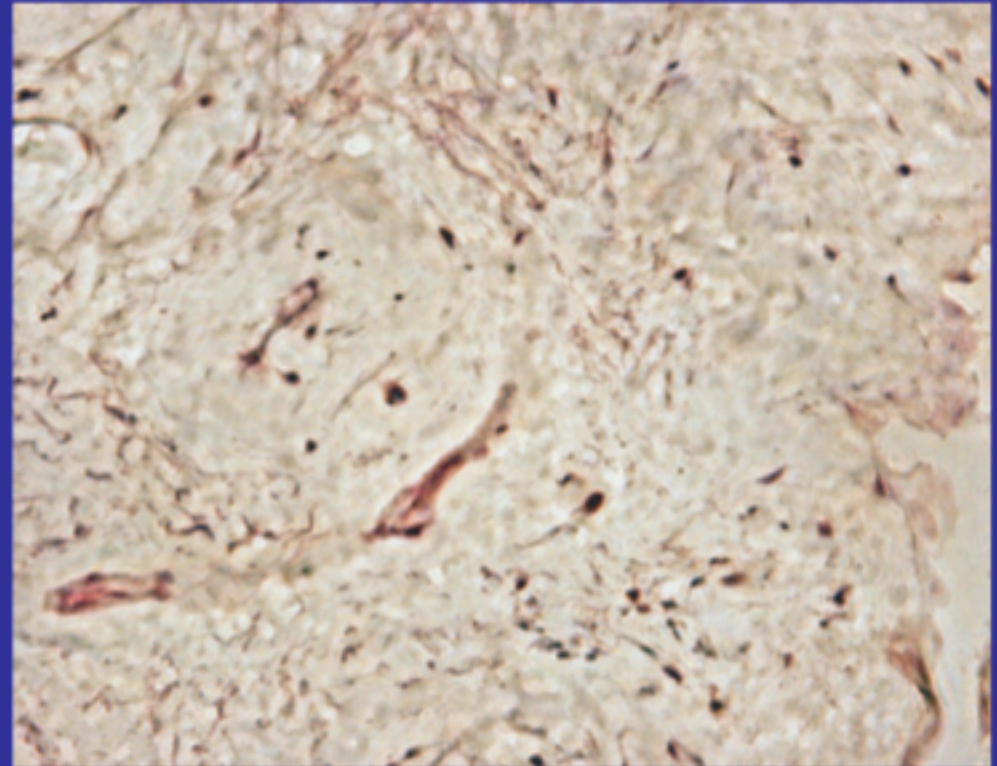
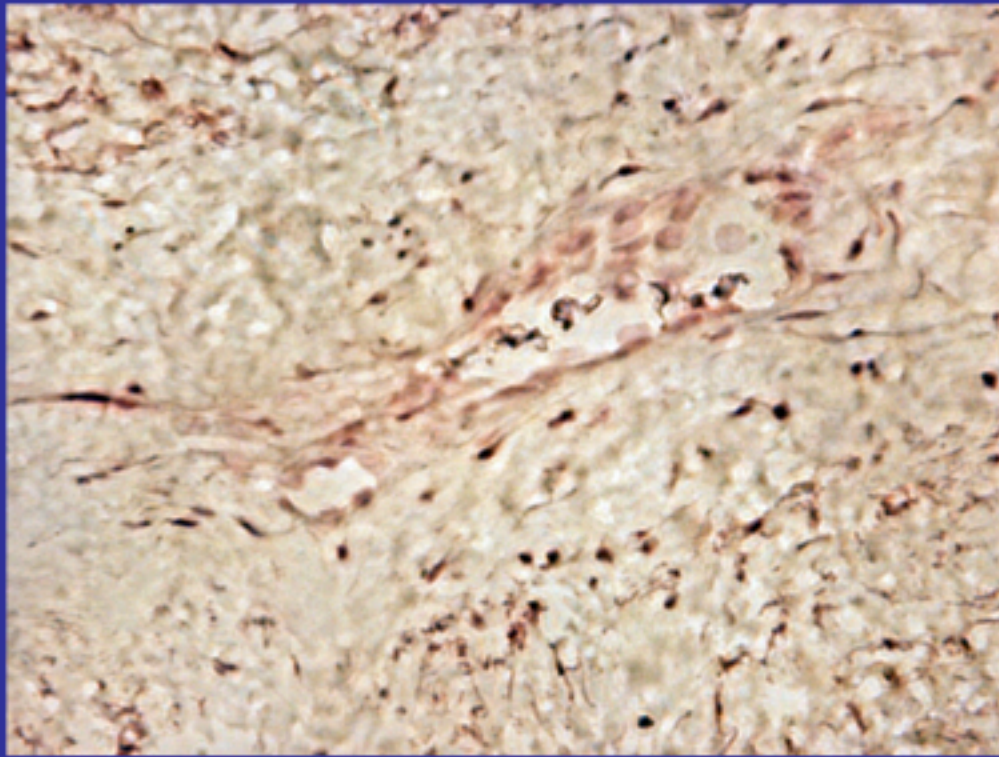
IHC for Estrogen Receptor Beta on Vaginal Submucosa from Patient VET-1



IHC for Estrogen Receptor Beta on Vaginal Epithelium from Patient VET-1



IHC of Vaginal Explanted Tissue Infected In Vitro with HIV pNL4-3

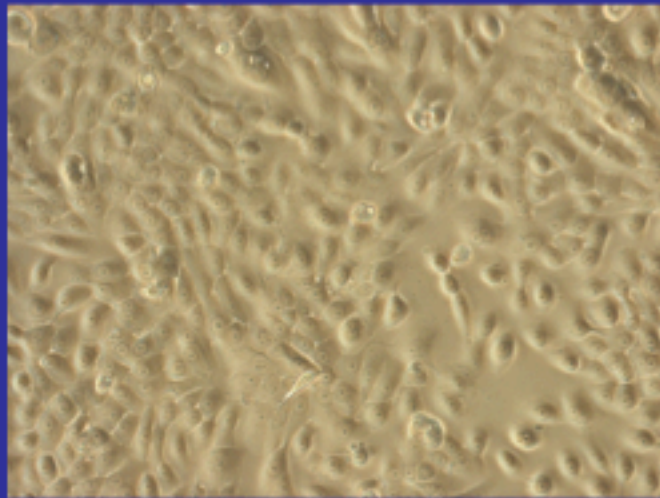


Normal vaginal epithelium explants from a 35 year old Hispanic woman taken during surgery was sectioned with a scalpel then infected with HIV pNL4-3. The infected explants were cultured in complete VK-2 media supplemented with pen/strep and Amphotericin-B. Five days post infection explants were washed in PBS pH 7.4 then fixed in 10% formalin. After overnight formalin fixation cell explants were embedded in paraffin and 5 micron sections were cut and placed on chemate slide for IHC staining. IHC staining was performed with a monoclonal antibody to HIV p24. DAB was used as a substrate for HRP and orcein was used as a counterstain. Infected explants can be visualized as cells staining brown in color. Photographs were taken on a Nikon TE2000S microscope fitted with a CCD camera at a total magnification of 200X.

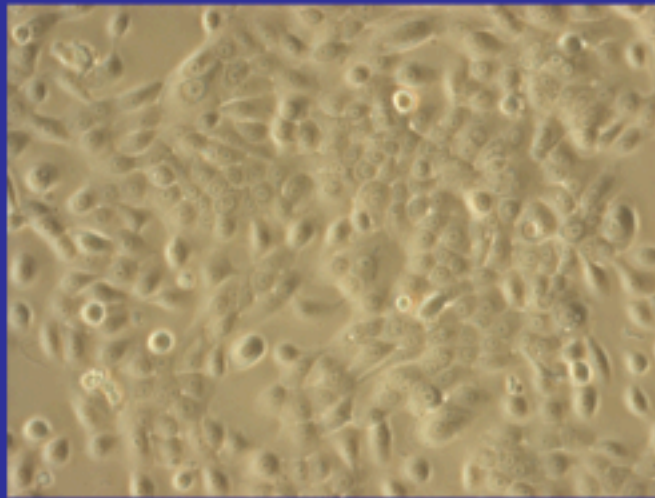


HIV Infection and Cultivation of the Squamous Vaginal Epithelial Cell Line VK2 after Exposure to BV+ and BV- CVL, and HIV negative Seminal Fluid

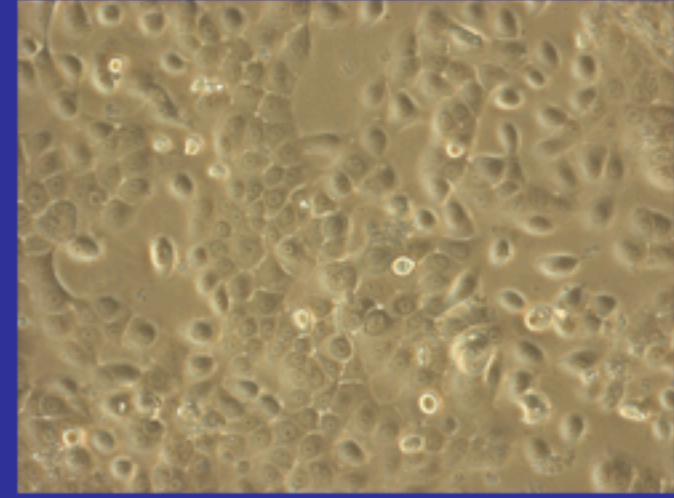
Mock Infected VK-2 Cells



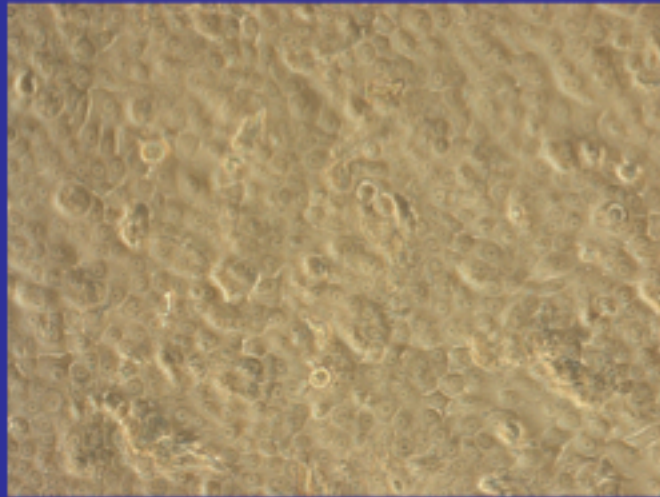
pNL4-3



pNL4-3 +BV- CVL



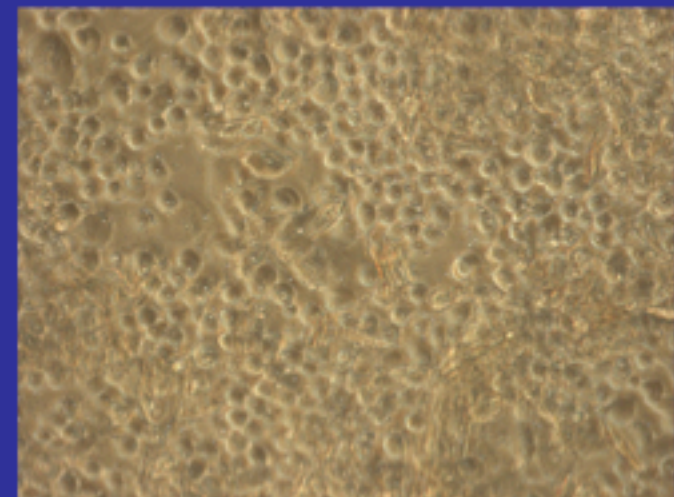
pNL4-3 +BV+ CVL



pNL4-3/+BV-CVL+ SF



pNL4-3/+BV+CVL+ SF

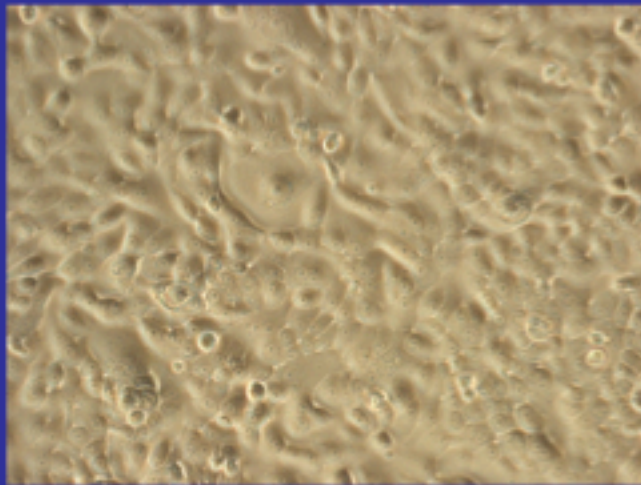


24 hours post infection/exposure 200x magnification

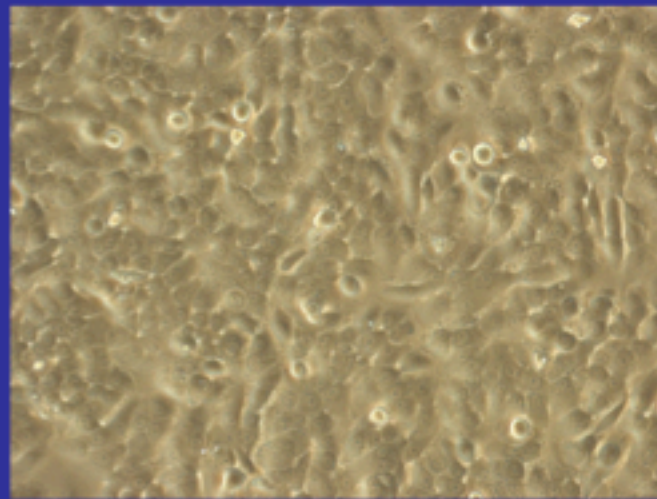


HIV Infection and Cultivation of the Squamous Vaginal Epithelial Cell Line VK2 after Exposure to BV+ and BV- CVL, and HIV negative Seminal Fluid

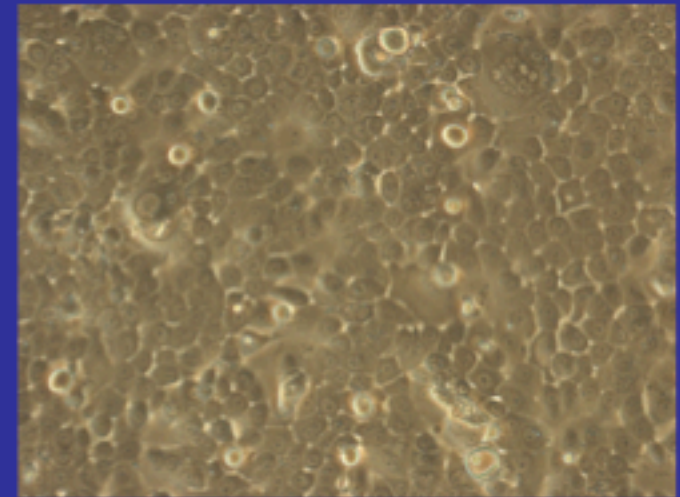
Mock Infected VK-2 Cells



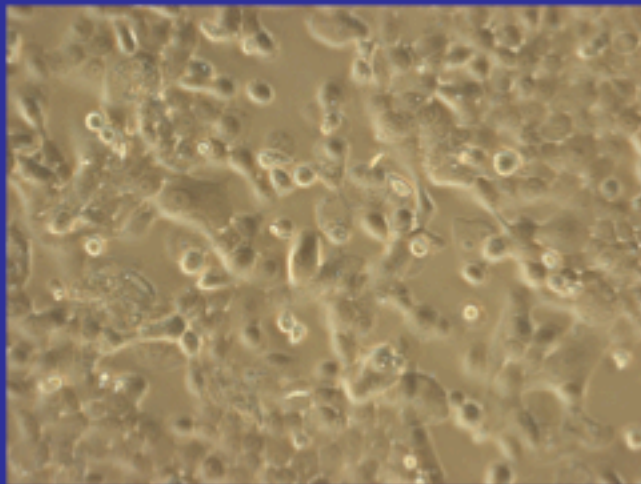
pNL4-3



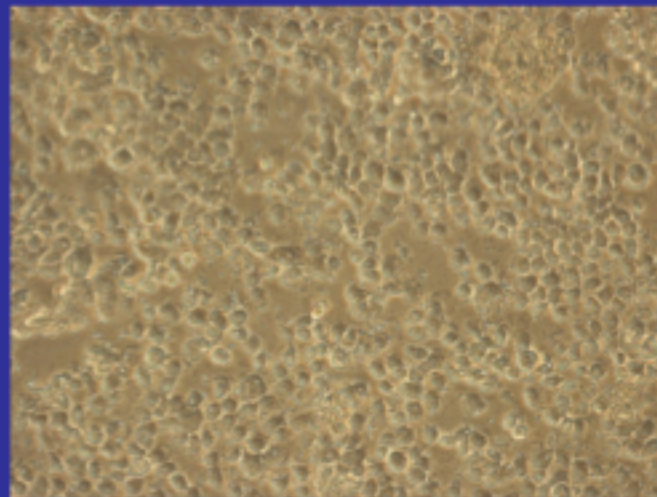
pNL4-3 +BV- CVL



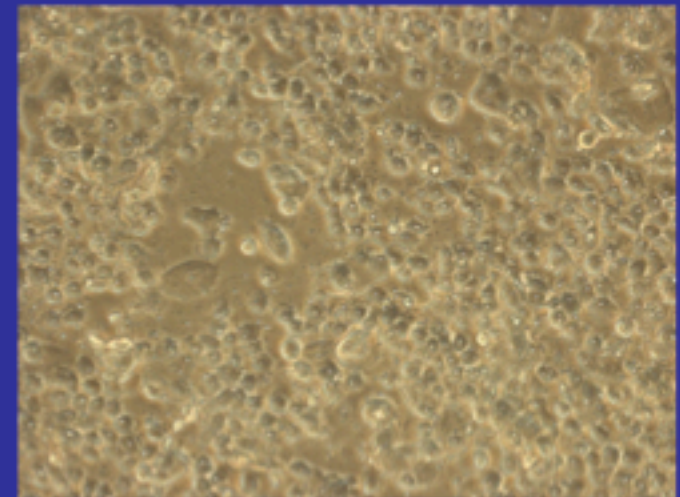
pNL4-3 +BV+ CVL



pNL4-3/+BV- CVL+ SF

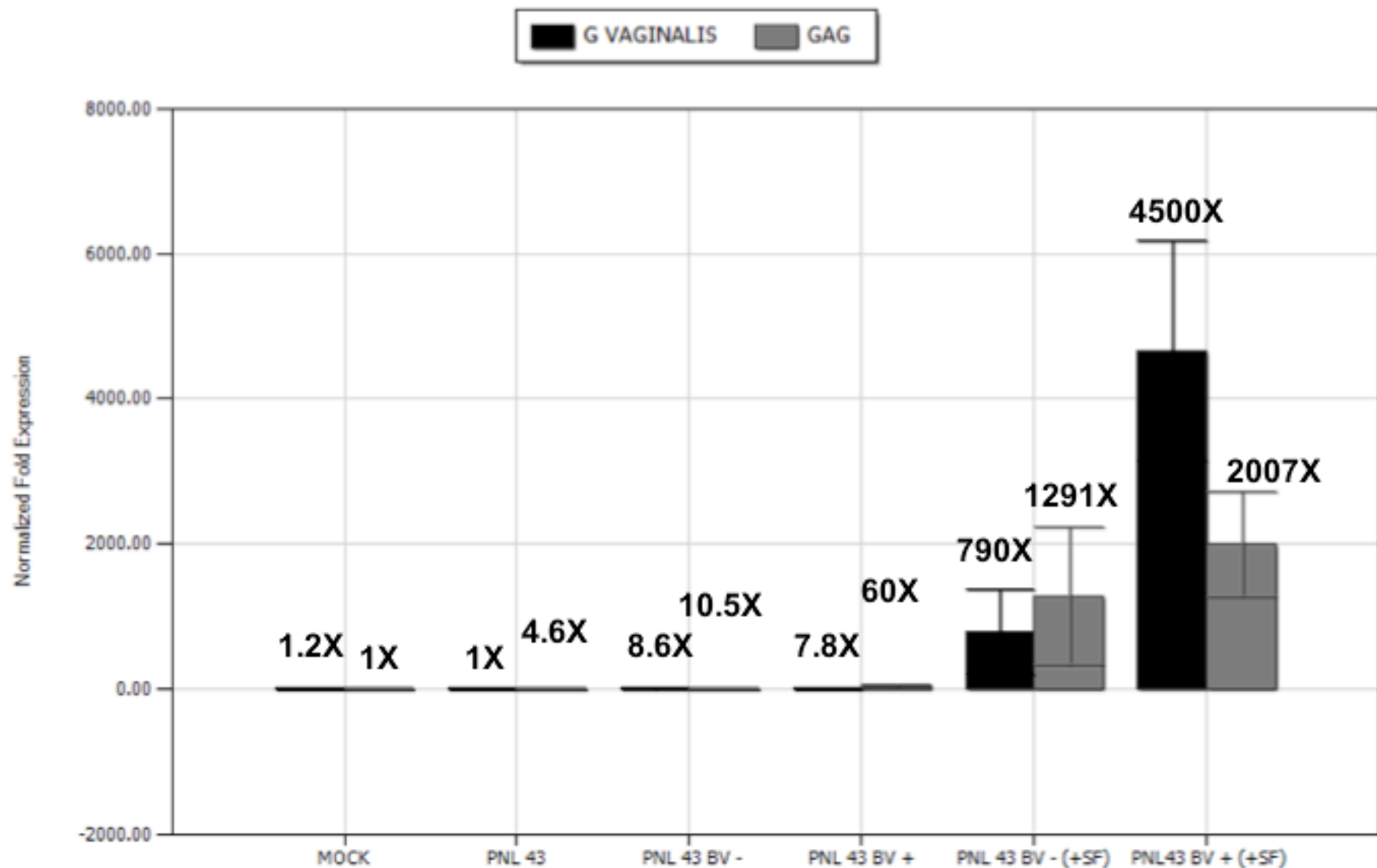


pNL4-3/+BV+CVL+ SF



48 hours post infection/exposure 200x magnification





Vaginal Tissue Microarray from Women of Different Ethnic Backgrounds

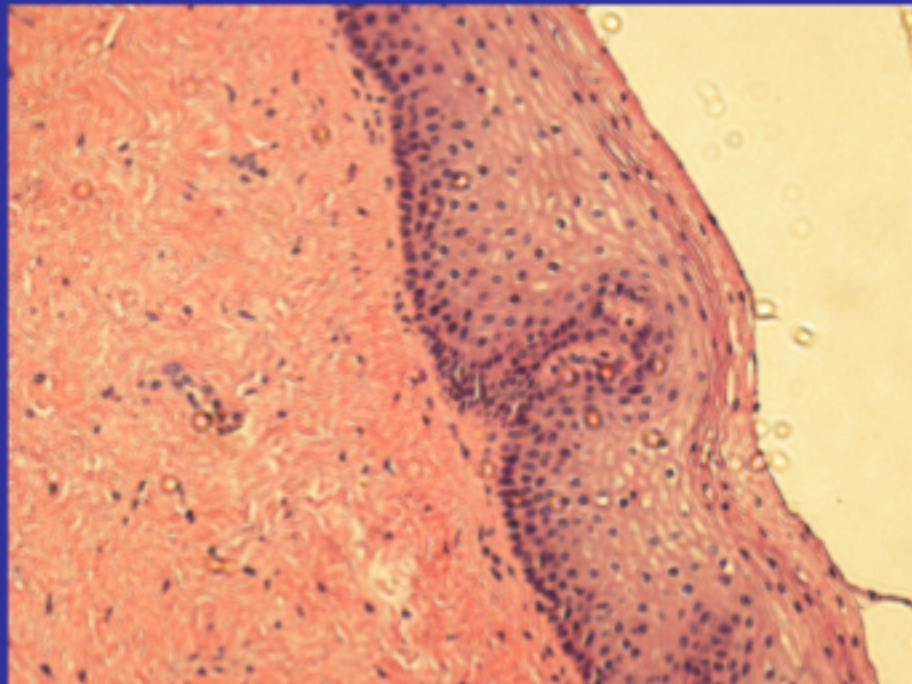
H&E Pattern of Vaginal Epithelial Tissue (VET) microarray developed in the Alcendor Lab at MMC/CAHDR

A.

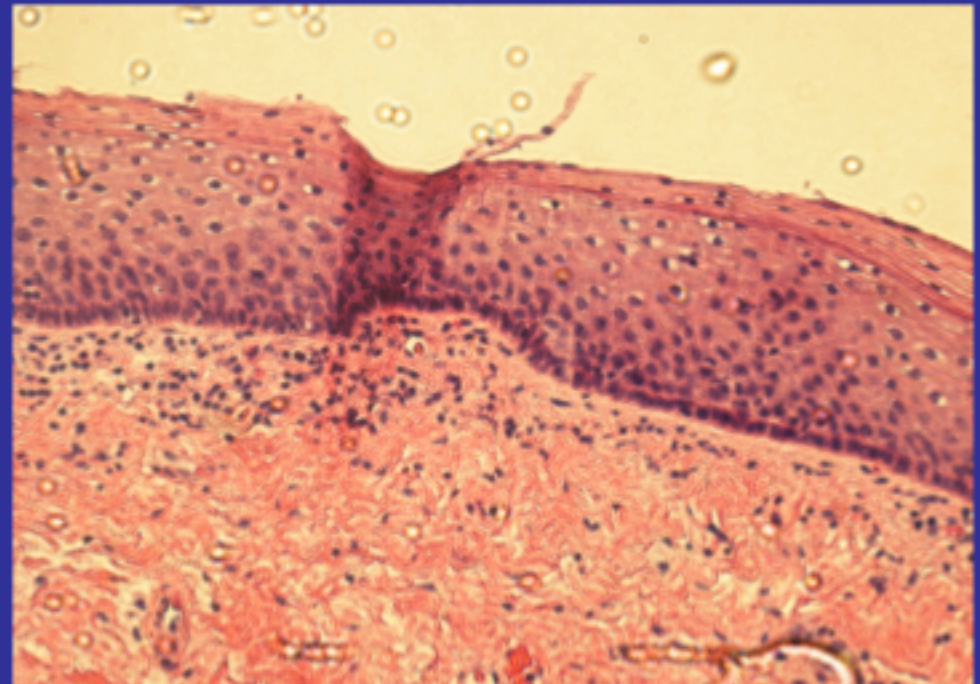


Paraffin embedded Vaginal Epithelial tissue (0.6mm cores) from women of different ethnic backgrounds were placed on glass slides. All 19 patients had elective surgeries at Metro General Hospital for urinary incontinence with associated vaginal prolapse. Dr. Ashen Chaudhry was the attending surgeon.

B. H&E stained vaginal epithelium



C. Repaired vaginal epithelium



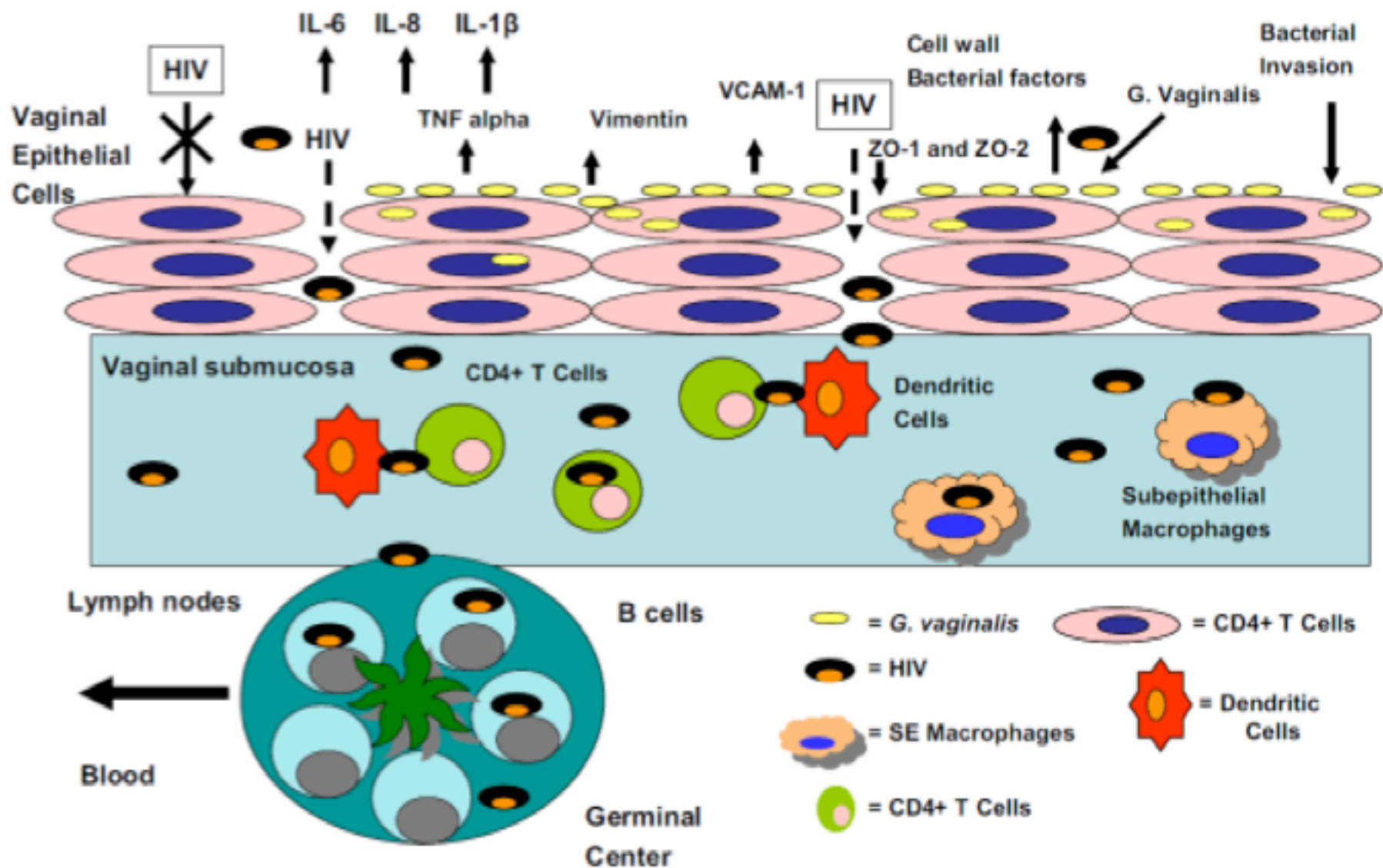
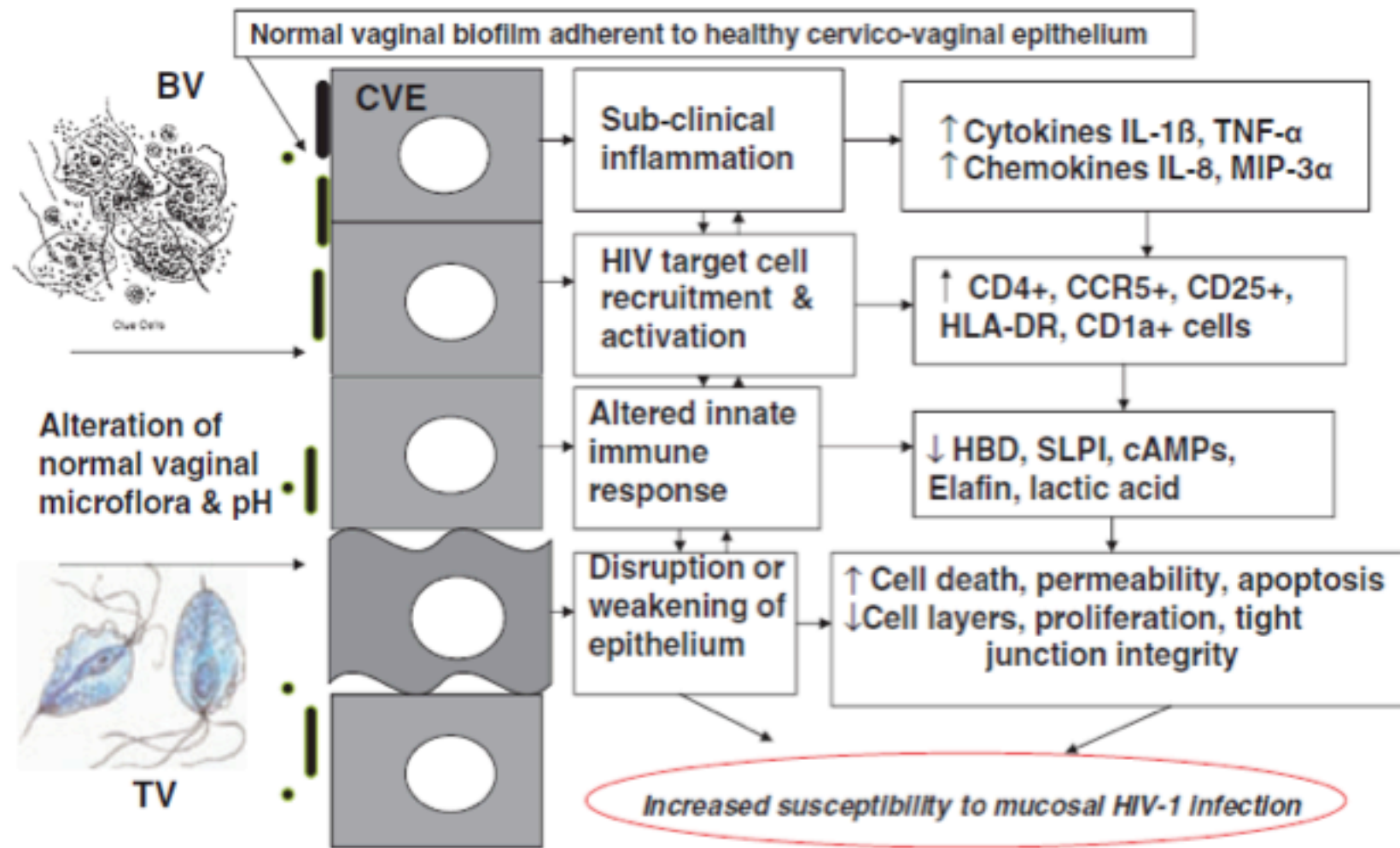
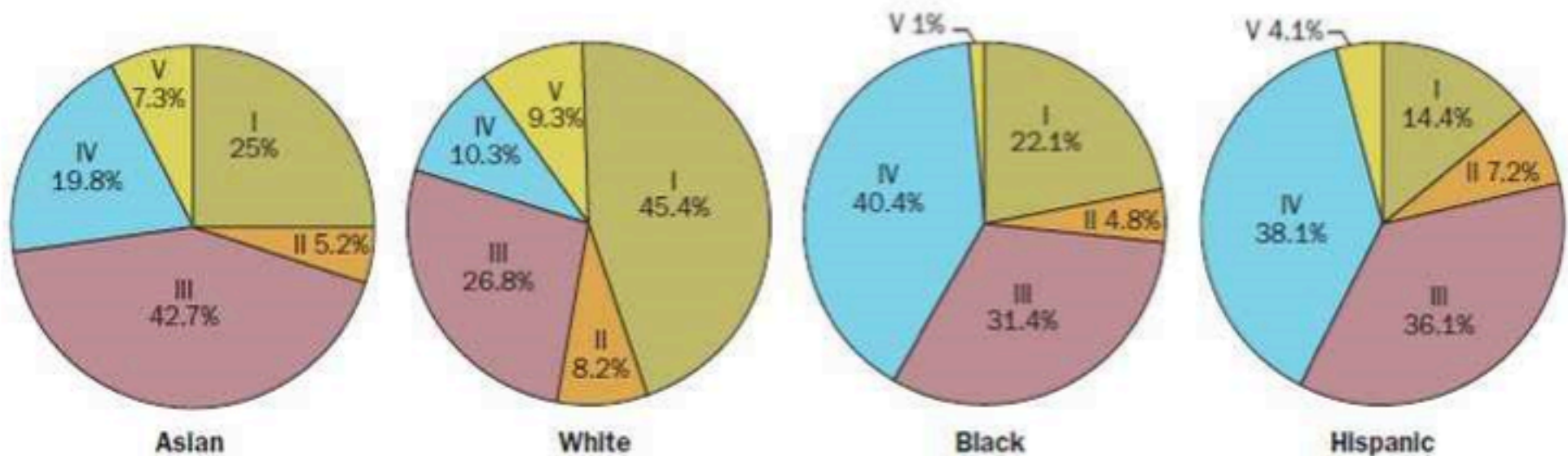


Fig. 1 Exposure of vaginal epithelial cells to *Gardnerella vaginalis* results in upregulation of proinflammatory cytokines, namely IL-6, IL-8, TNF- α , and IL-1 β . Vimentin is upregulated after *G. vaginalis* exposure. Upregulation of vimentin influences uptake and internalization of bacteria. Tight junction proteins (TJ) ZO1 and ZO2 are downregulated in vaginal epithelial cells exposed to *G. vaginalis*. Downregulation of TJ proteins could result in HIV passing in between cells (paracellular transport) in route to the vaginal submucosa where subepithelial T cells and macrophages reside and are highly permissive for HIV infection. Trafficking of infected T cells by resident lymph nodes would facilitate HIV dissemination via the blood.

Hypothetical mechanisms of BV and TV enhancement of HIV infection

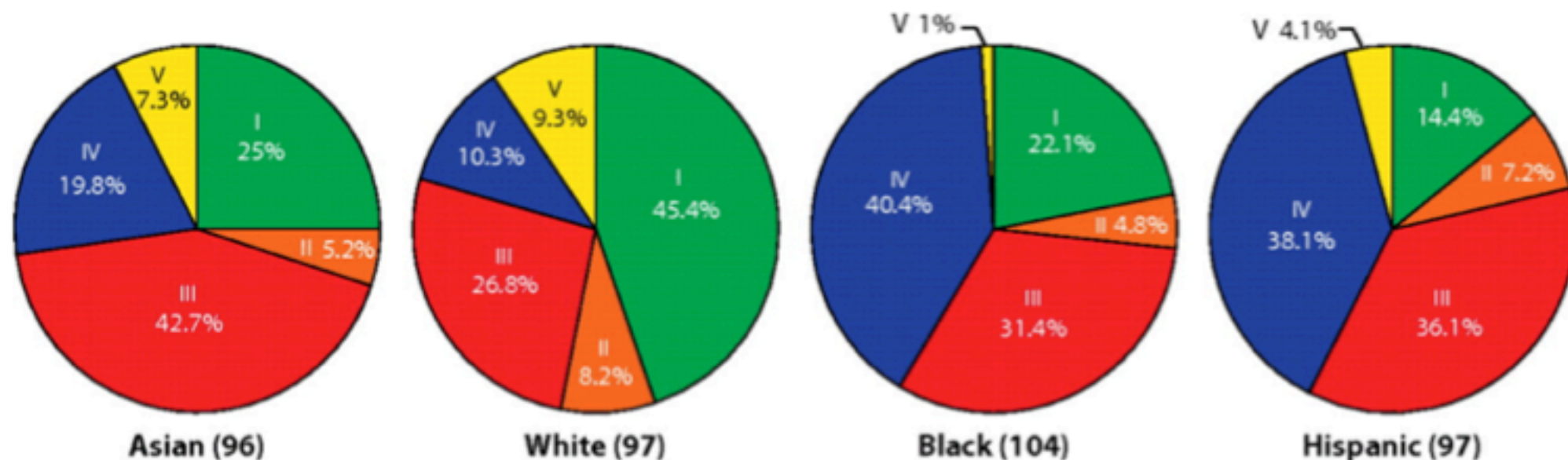


Vaginal microbiome makeup by race/ethnicity



A study⁵⁵ of the vaginal microbiomes of nearly 400 healthy women identified five major groups of microbial communities (groups I–V) that appeared in different proportions by ethnicity. Groups I, II, III, and V were dominated by *Lactobacillus* species, which are thought to play important protective roles in vaginal health. Group IV included a diversity of anaerobic species such as *Prevotella* and *Gardnerella*. Compared with white and Asian women, Hispanic and black women tended to have more group IV communities and higher vaginal pH values. The authors suggest that genetics and hygiene behaviors are just two factors that could account for the differences in microbiomes between ethnic groups. Reproduced with permission from *Proceedings of the National Academy of Sciences*

Proportions of women of different ethnicity with different microbiome community types. Community **type IV** is most prevalent in black and Hispanic women and lacks *Lactobacillus*. All other community types have some species of *Lactobacillus*, though different species dominate each community type. The number of women sampled from each ethnic group is in parentheses.



- Group IV was dominated by a diversity of strictly anaerobic bacteria, but also included *L. iners* and *L. crispatus*, though the lactobacilli did not dominate the microbiome.
- *Prevotella* sp. were also found in 68.5% of the samples and could be linked to bacterial vaginosis. *Prevotella* is known to produce ammonia and amino acids that promote the growth of *Gardnerella vaginalis* and *Peptostreptococcus anaerobius*, other bacteria commonly found in BV.
- High Nugent scores (indicating BV) were most frequently associated with group IV microbiome community compositions that were not dominated by *Lactobacillus*, though some individuals of all group types had high Nugent scores.
- Lowest pH values associated with groups dominated by *L. iners* and *L. crispatus*.

Terminology (for today)



- For people without HIV infection
 - PrEP
 - Taking oral antiretroviral medicines daily for months to years
 - nPEP
 - Taking oral antiretroviral medicines daily for 28 days after possible exposure to HIV
 - Microbicides
 - Applying an antiretroviral preparation into the vaginal or rectum (topically)
- For people with HIV infection
 - Treatment as Prevention (TasP)
 - Taking oral antiretroviral medicines daily for months to years to reduce chances of giving HIV to sexual partner(s)

What is **non-occupational post-exposure prophylaxis (nPEP)**?

Prophylaxis" is a medical intervention designed to prevent disease. So, *post-exposure prophylaxis* for HIV is a medical intervention designed to prevent HIV infection after exposure to the virus. Prophylaxis for HIV is only available with a prescription.

Who should receive nPEP?

nPEP is strongly recommended for anyone who has had unprotected receptive vaginal or anal intercourse or who has shared an IV needle with an HIV-infected partner or with a partner whose HIV status is unknown.

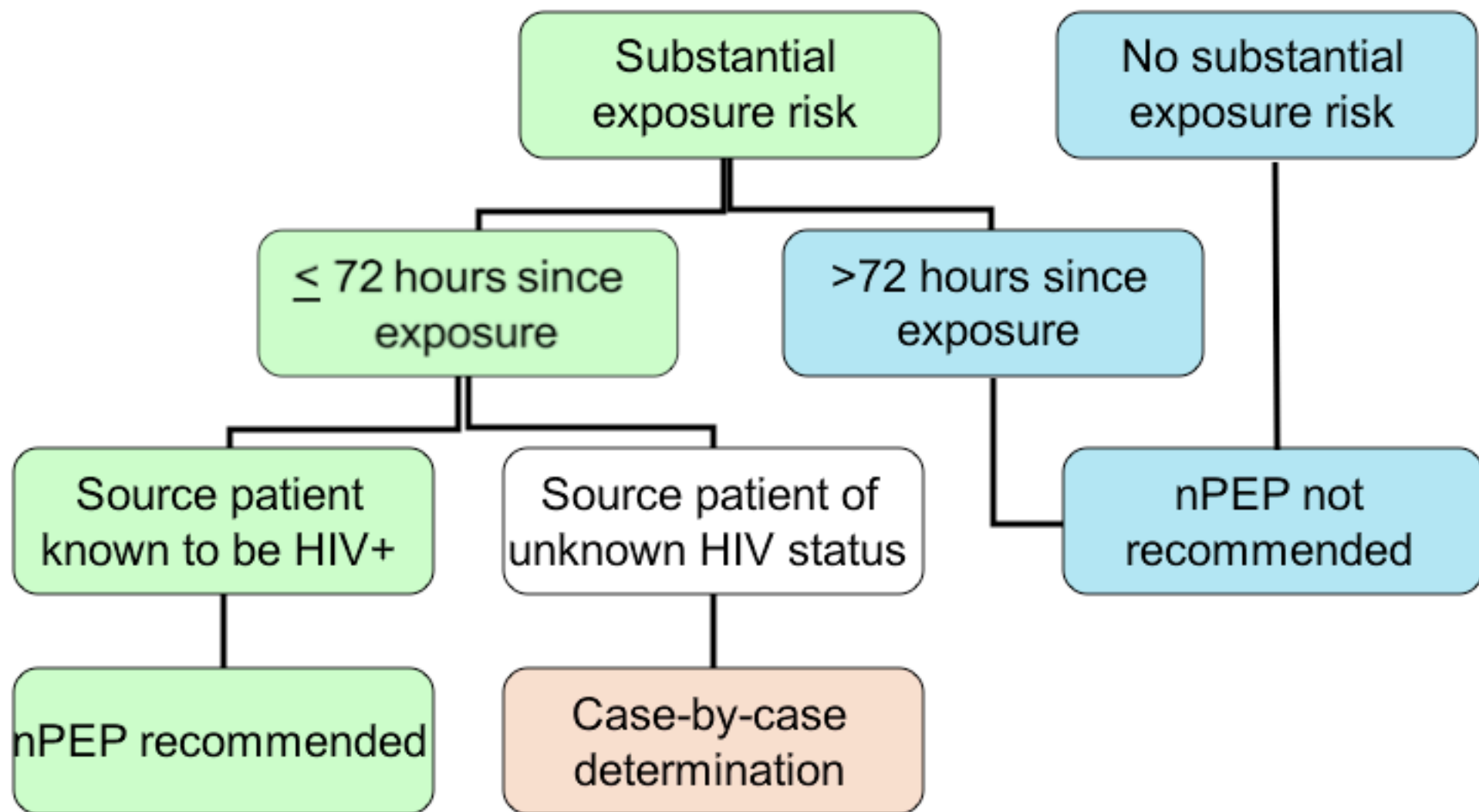
Is nPEP a "morning after" pill?

nPEP is a medical intervention that involves taking medication, usually twice a day, for 28 days. nPEP patients should expect laboratory tests and follow-up visits at 2 weeks, 4-6 weeks, 12 weeks, and 24 weeks post-exposure. In other words, nPEP is not a substitute for safer sex.

What about sex during nPEP?

Use condoms until your final follow-up visit at 6 months post-exposure. nPEP is not guaranteed to work and you could put your partner(s) at risk of contracting HIV. Also, you may put yourself at risk of a new HIV exposure. Again, **nPEP is not a substitute for safer sex.**

Recommendations for nPEP



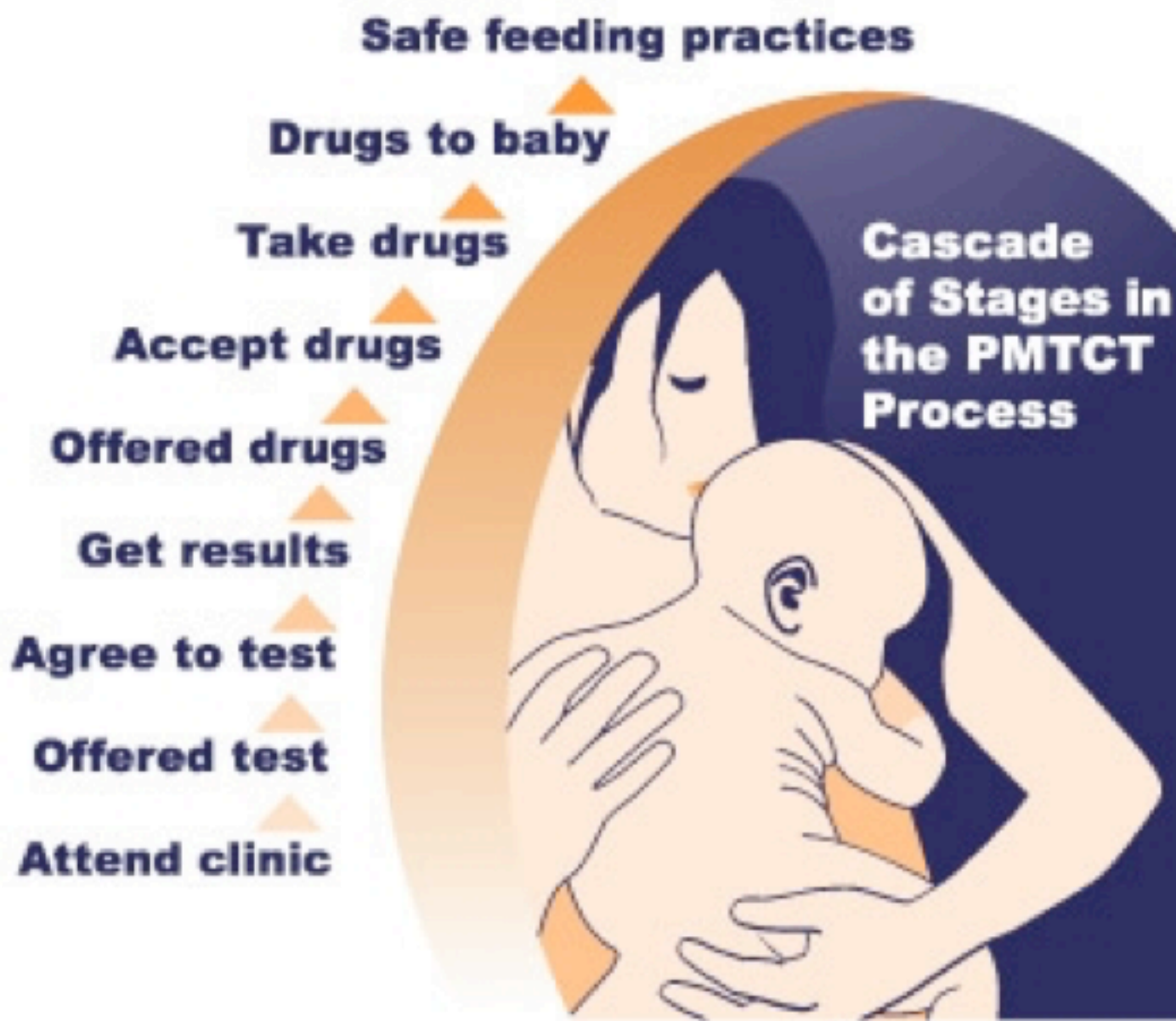
Barriers to effective use

■ Users

- Unaware of level of personal risk
- Unaware of intervention
- Don't know how or where to access the intervention
- Delay in seeking clinical preventive care
- Uninsured/unable to pay for medication
- Low adherence to medication

■ Providers

- Unaware of intervention
- Uncertain how to deliver the intervention
- Wary of complexity and time involved
- Low index of suspicion for indications
- Low access to the highest risk populations
- Uncertain how to bill for the intervention



Mother to Child transmission of HIV (~ 8,500 women living with HIV give birth annually).

CDC recommends that all women who are pregnant or planning to get pregnant take an HIV test as early as possible before and during every pregnancy.

- All women who are pregnant or planning to get pregnant should get tested for HIV as early as possible.

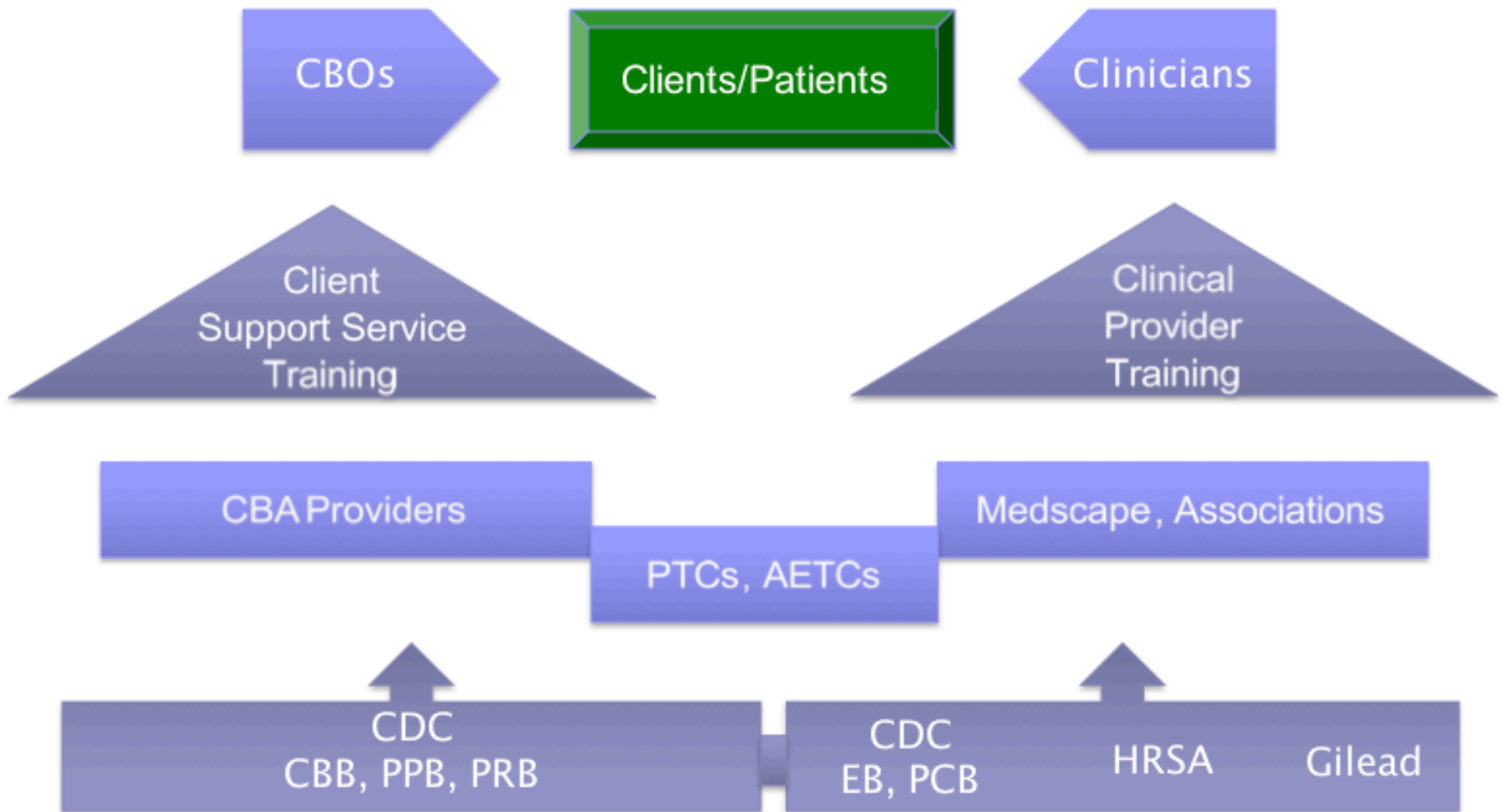
- If a woman is treated for HIV early in her pregnancy, the risk of transmitting HIV to her baby can be 1% or less.

- With current treatment, many people who have perinatal HIV are living long into adulthood.

HIV infections through perinatal transmission have declined by more than 90% since the early 1990s, while the number of HIV-infected women giving birth has increased. Today, if a woman takes HIV medicines exactly as prescribed throughout pregnancy, labor, and delivery, and provides HIV medicines to her baby for 4-6 weeks, the risk of transmitting HIV can be 1% or less.

Women who are HIV-negative but have an HIV-positive partner should talk to their doctor about taking HIV medicines daily, called pre-exposure prophylaxis (PrEP), to protect themselves while trying to get pregnant, and to protect themselves and their baby during pregnancy and while breastfeeding.

CBOs and Biomedical Interventions





Questions ?



