

The History of HIV and HIV Simplified: All You Need to Know

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Disclosures

I have no financial conflicts of interest to disclose



Objectives



Learn the "origin story" of HIV

Discuss 7 key points about the HIV epidemic today



Reflect...

• If you had to tell someone one thing about the origin of the HIV epidemic, what would it be? • If you had to tell someone one thing about HIV today, what would it be?





30,000 foot view



It Didn't Start in the 1980's...

- 1921, somewhere between Cameroon and the former Belgian Congo
- Fragile virus infecting a small number of chimpanzees
- Infecting an even smaller number of bush-meat hunters



https://www.nytimes.com/2011/10/18/health/ 18aids.html?pagewanted=2&hpw



Followed by "amplifiers"...

- 1920s machine made glass syringes- vaccination campaigns
- The "twin cities" of Congo: Leopoldville (now Kinshasa) on the Belgian side, Brazzaville on the French
 - Earliest positive blood sample found here in 1959
 - Post- WWII expansion of brothels here
 - Haitian bureaucrats hired by the UN
 - 1966 HIV reached Haiti according to molecular dating
 - Sex tourism, possibly Port-au-Prince plasma center

https://www.nytimes.com/2011/10/18/health/ 18aids.html?pagewanted=2&hpw



And then...

CENTERS FOR DISEASE CONTROL

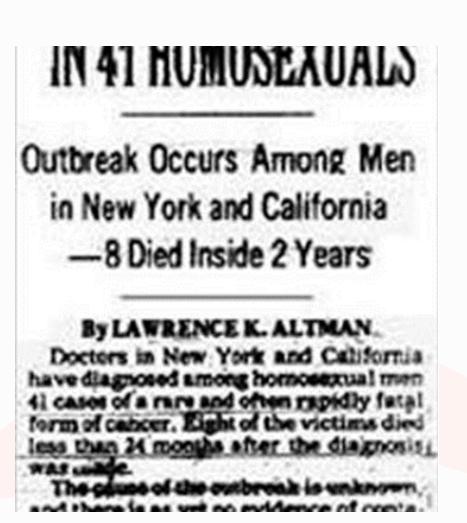
MMR

MORBIDITY AND MORTALITY WEEKLY REPOR

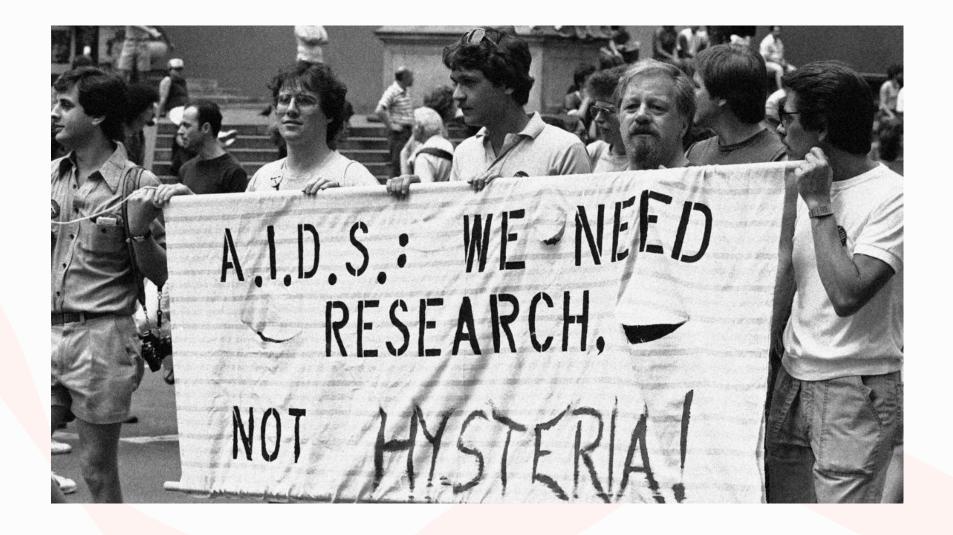
Pneumocystis Pneumo

In the period October 1980-May 1981, 5 sated for biopsy-confirmed *Pneumocystis c*. Los Angeles, California. Two of the patienfirmed previous or current cytomegaloviru fection. Case reports of these patients follow.

Patient 1: A previously healthy 33-year-old al mucosal candidiasis in March 1981 after a







Those Who Will Not Be Forgotten



THAT WAS THEN THIS IS NOW



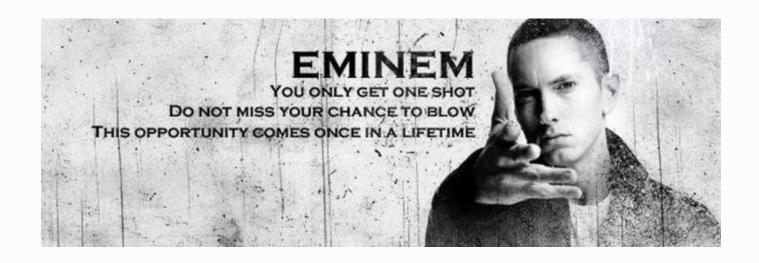
What I should be talking about...

II. HIV Basics for Medical Professionals (20 minutes)

- 1. Understanding HIV (5 minutes)
 - Virus Characteristics:
 - HIV is a retrovirus that attacks CD4+ T cells, crucial for immune function.
 - Distinction between HIV-1 and HIV-2.
 - Stages of Infection:
 - Acute HIV infection, clinical latency (chronic HIV), and AIDS (Acquired Immunodeficiency Syndrome).
- 2. Transmission and Prevention (5 minutes)
 - Modes of Transmission:
 - Sexual contact, bloodborne exposure, vertical transmission (mother-to-child), and sharing needles.
 - Prevention Strategies:
 - Safe sex practices, needle exchange programs, and the role of PrEP and PEP (Post-Exposure Prophylaxis).
- 3. Diagnosis and Monitoring (5 minutes)



What I'm actually going to talk about...



"Basically, the talk you would give to a room full of folks if you only had their attention for an hour."



Key Points

- 1. HIV is an ongoing threat, and many marginalized communities are disproportionately affected. IT IS NOT OVER.
- 2. NO ONE should die of HIV today (but many still do).
- 3. HIV treatment is easy (often one pill a day), cure is not.
- 4. PWH can NOT transmit to partners if undetectable.
- 5. Prevention and treatment advances are coming rapidly, long-acting technology is the future.
- 6. We have the tools to END the epidemic.
- 7. Yet barriers still exist, and policies are making this harder than it needs to be.



- HIV remains a major global public health issue, having claimed an estimated 42.3 million lives to date.
- There were an estimated 39.9 million people living with HIV at the end of 2023.
- In 2023, an estimated 630,000 people died from HIVrelated causes and an estimated 1.3 million people acquired HIV.

https://www.who.int/news-room/fact-sheets/detail/hiv-aids

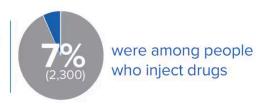


Estimated HIV infections in the US by transmission category, 2022

There were **31,800 estimated new HIV infections** in the US in 2022. Of those:



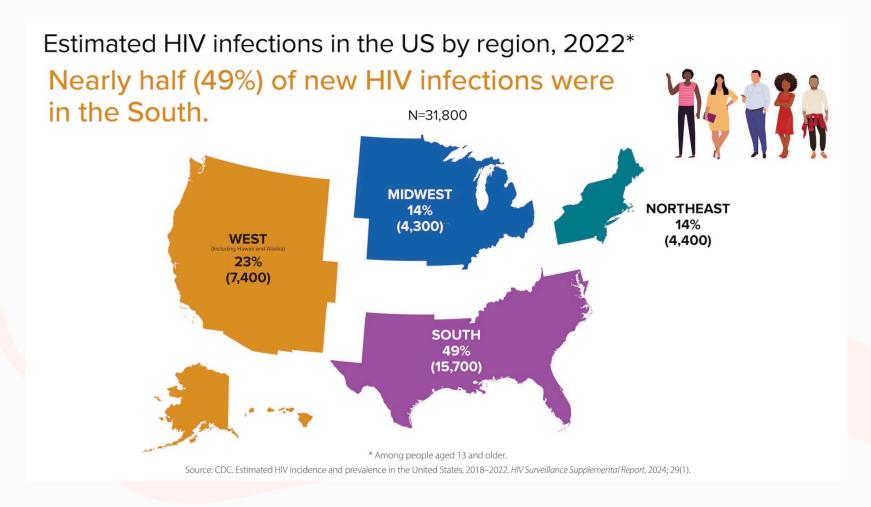




* Includes infections attributed to male-to-male sexual contact and injection drug use (men who reported both risk factors).

Source: CDC. Estimated HIV incidence and prevalence in the United States, 2018–2022. HIV Surveillance Supplemental Report, 2024; 29(1).

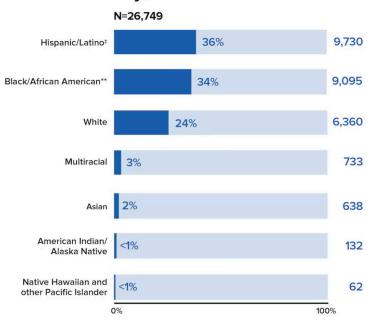






HIV diagnoses among gay and bisexual men in the US and 6 territories and freely associated states by race and ethnicity, 2022**

Among gay and bisexual men who received an HIV diagnosis in 2022, racial and ethnic disparities continue to exist.



^{*} Among people aged 13 and older.

^{**} Black refers to people having origins in any of the Black racial groups of Africa. African American is a term often used for people of African descent with ancestry in North America. Source: CDC. Diagnoses, deaths, and prevalance of HIV in the United States and 6 territories and freely associated states, 2022. HIV Surveillance Report, 2024; 35.



[†] Includes infections attributed to male-to-male sexual contact and injection drug use (men who reported both risk factors).

[‡] Hispanic/Latino people can be of any race.

Racial and ethnic disparities exist among transgender women with HIV.



Among transgender women interviewed, 42% had HIV.



of Black/African
American transgender
women had HIV



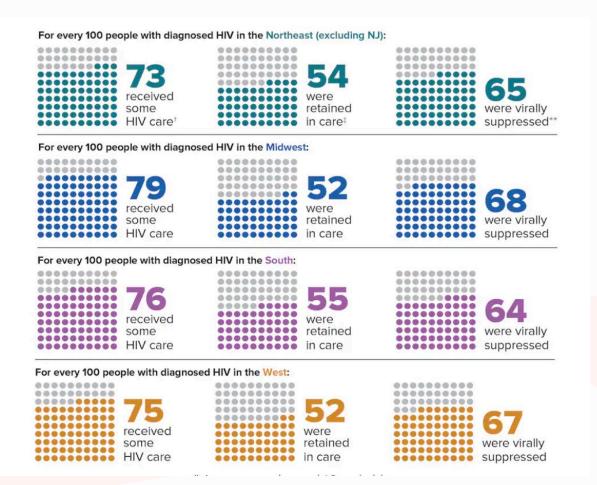
of Hispanic/Latina transgender women had HIV



of White transgender women had HIV

https://www.cdc.gov/hiv/data-research/facts-stats/transgender-people.html







 In the US, things are worse for LGBTQ+ populations (esp transgender) people of color, Black women, and in the South.





2. NO ONE should die of HIV today (but many still do).

Without Treatment

- Once people receive an AIDS diagnosis, they typically live for 3 years.
- Pre-1996, many people only lived 1-2 years after receiving a diagnosis.

With Treatment

Life expectancy approaches that of those without HIV, if treatment is started early.

https://www.cdc.gov/hiv/about/?CDC_AAref_ Val=https://www.cdc.gov/hiv/basics/whatishiv.html

https://www.thelancet.com/journals/lanhl/article/PIIS2666-7568(22)00063-0/fulltext



2. NO ONE should die of HIV today (but many still do).

- In 2021, there were 19,986 deaths among adults and adolescents with diagnosed HIV in the US.
- Reasons for dying of HIV:
 - Mental health
 - Substance use disorder
 - Poverty
 - Access to medications
 - Stigma



https://www.hiv.gov/hiv-basics/overview/data-and-trends/statistics



2. NO ONE should die of HIV today (but many still do).

- ALL people in the US should have free access to treatment.
- Treatment CAN mean a long and healthy life.





3. HIV treatment is easy (often one pill a day), cure is not.

- There are more than 50 currently approved HIV medications across 7 different classes.
- Often just one pill a day (Bictegravir/emtricitabine/tenofovir alafenamide).
- Monthly or every other month injection also available (cabotegravir/rilpivirine).
- Easier than HTN or DM?



3. HIV treatment is easy (often one pill a day), cure is not.

- There is no cure. But some people have probably or possibly been cured.
- The problem: dormancy of the viral reservoir.
- We know what we have to do- have to figure out HOW to do it.



Timothy Ray Brown, aka the "Berlin patient" was treated for AML. Announced in 2008.

He died of recurrent leukemia in 2020.

https://iasociety.org/blog/takeaways-from-aids-2024.



4. PWH can NOT transmit to partners if undetectable.

A person living with HIV who is on treatment and maintains an undetectable viral load has zero risk of transmitting HIV to their sexual partners.



Eisinger, R. W., Fauci, A. S., & Marston, B. J. (2019). HIV as a Chronic Disease: The U=U Campaign. *NEJM* 381, 1707-1709.



4. PWH can NOT transmit to partners if undetectable.

- Zero risk of sexual transmission if VL < 200.
- Almost zero risk of sexual transmission if VL < 1000.



The risk of sexual transmission of HIV in individuals with low-level HIV viraemia: a systematic review



Laura N Broyles, Robert Luo, Debi Boeras, Lara Vojnov

Summary

Lancet 2023: 402: 464-71

Published Online July 23, 2023 https://doi.org/10.1016/ S0140-6736(23)00877-2

See Comment page 428

Global Health Impact Group, Atlanta, GA, USA (L N Broyles MD, R Luo MD, D Boeras PhD); WHO, Geneva, Switzerland (L Vojnov PhD)

> Correspondence to: Dr Lara Vojnov, WHO, Geneva 1211, Switzerland vojnovl@who.int

Background The risk of sexual transmission of HIV from individuals with low-level HIV viraemia receiving antiretroviral therapy (ART) has important public health implications, especially in resource-limited settings that use alternatives to plasma-based viral load testing. This Article summarises the evidence related to sexual transmission of HIV at varying HIV viral load levels to inform messaging for people living with HIV, their partners, their health-care providers, and the wider public.

Methods We conducted a systematic review and searched PubMed, MEDLINE, Cochrane Central Register of Controlled Trials, Embase, Conference Proceedings Citation Index-Science, and WHO Global Index Medicus, for work published from Jan 1, 2010 to Nov 17, 2022. Studies were included if they pertained to sexual transmission between serodiscordant couples at various levels of viraemia, the science behind undetectable=untransmittable, or the public health impact of low-level viraemia. Studies were excluded if they did not specify viral load thresholds or a definition for low-level viraemia or did not provide quantitative viral load information for transmission outcomes. Reviews, non-research letters, commentaries, and editorials were excluded. Risk of bias was evaluated using the ROBINS-I framework. Data were extracted and summarised with a focus on HIV sexual transmission at varying HIV viral loads.



- PrEP reduces the risk of getting HIV from sex by about 99%.
- PrEP reduces the risk of getting HIV from injection drug use by at least 74%.



Generic PrEP (TDF/FTC) was approved in October 2020.

DRUG	ADULT DOSING INFO	APPROVED FOR
Truvada (tenofovir disoproxil fumarate + emtricitabine)	One tablet once a day. Each tablet contains 300 mg tenofovir disoproxil fumarate (TDF) + 200 mg emtricitabine.	Approved for HIV- negative men, women and transgender individuals at risk for sexually acquired HIV. Generic version available.
Descovy (tenofovir alafenamide fumarate + emtricitabine)	One tablet once a day. Each tablet contains 25 mg tenofovir alafenamide fumarate (TAF) + 200 mg emtricitabine.	Not approved for those at risk for HIV acquisition via vaginal sex.
Apretude (cabotegravir)	Apretude is initiated with two 600 mg injections given one month apart for the first two months, after which injections are given every two months. Alternatively, oral cabotegravir (Vocabria) may be taken for four weeks before the injections. Apretude is given as a single injection in the buttocks by a health care worker every other month.	Approved for HIV- negative men, women and transgender individuals at risk for sexually acquired HIV.

July 2012

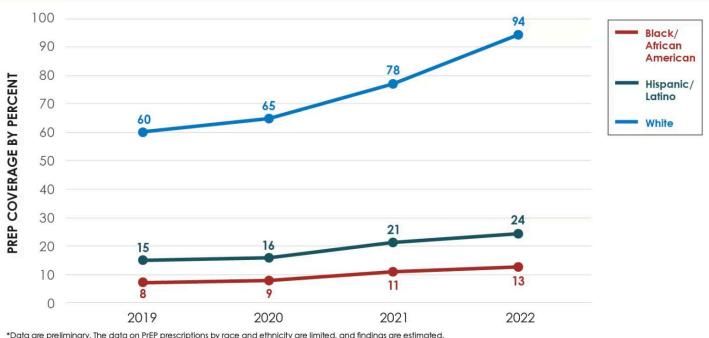
Oct 2019

Dec 2021

https://www.poz.com/page/hiv-prevention-drug-chart



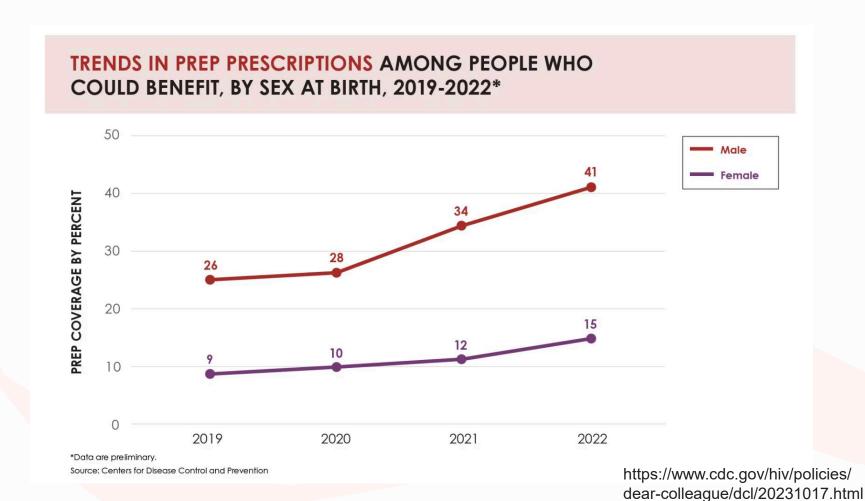




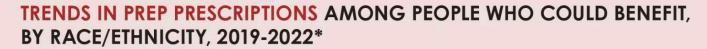
*Data are preliminary. The data on PrEP prescriptions by race and ethnicity are limited, and findings are estimated. Source: Centers for Disease Control and Prevention

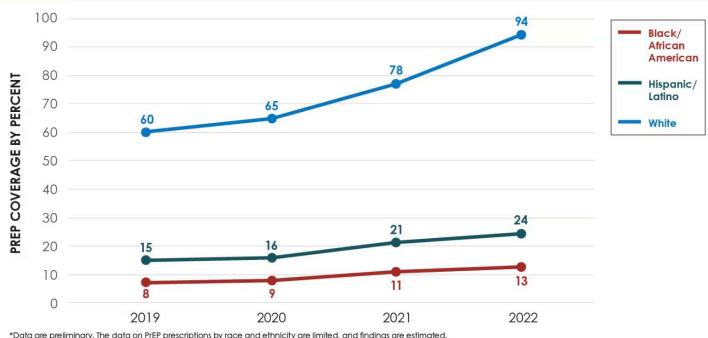
https://www.cdc.gov/hiv/policies/dear-colleague/dcl/20231017.html











*Data are preliminary. The data on PrEP prescriptions by race and ethnicity are limited, and findings are estimated. Source: Centers for Disease Control and Prevention



NIAID is funding research on 4 types of long-acting HIV prevention.

INTRAVAGINAL RING (IVR)



Polymer ring inserted into the vagina releases antiretroviral drug over time.

IMPLANT



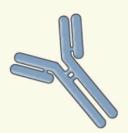
Device implanted in the body releases antiretroviral drug over time.

INJECTABLE



Long-acting antiretroviral drug is injected into the body.

ANTIBODY



Antibody is infused or injected into the body.

NIH National Institute of Allergy and Infectious Diseases: Long-Acting Forms of HIV Prevention

https://www.hiv.gov/hiv-basics/hiv-prevention/potential-future-options/long-acting-prep





AIDS 2024: "Miracle" long-acting injectable provides 100% protection against HIV, researchers find



- PURPOSE 1
- Lenacapavir vs FTC/TDF vs FTC TAF
- No one in the lenacapvir arm acquired HIV
- Vs 16 in Truvada arm and 39 in Descovy arm



Antiretroviral drug chart

Generic name	Trade	name	Formulation	Standard adult dose	Pills/ day	Major side effects	Food requirements	
Single-tablet regimens								
Bictegravir/ emtricitabine/tenofovir alafenamide	Biktarvy	9883	Tablet comprising 50mg bictegravir, 200mg emtricitabine, 25mg tenofovir alafenamide	One tablet once a day	1	Common: Depression, abnormal dreams, headache, dizziness, tiredness, nausea, diarrhoea Rare: Suicidal thoughts and behaviour, severe rash with fever (Stevens-Johnson syndrome)	Take with or without food	
Darunavir/cobicistat/ emtricitabine/tenofovir alafenamide	Symtuza	JG	Tablet comprising 800mg darunavir, 150mg cobicistat, 200mg emtricitabine, 10mg tenofovir alafenamide	One tablet once a day	1	Common: Allergic (hypersensitivity) reaction, loss of appetite, abnormal dreams, diabetes, raised lipid or liver or pancreatic enzyme or creatinine levels, headache, dizzness, diarrhoea, nausea, vomiting, abdominal pain, bloating, indigestion, flatulence, facial swelling, rash, itching, aching joints or muscles, terderes, Seeling week. Rares Severe nash with fever (Stevens-Johnson syndrome)	Take with food	
Dolutegravir/abacavir/ lamivudine	Triumeq	572 Tri	Tablet comprising 50mg dolutegravir, 600mg abacavir, 300mg lamivudine	One tablet once a day	1	Common: Difficulty in sleeping, sleepiness, abnormal dreams, depression, headache, diarnhoea, nausea, fatigue, rash, Itching, vomiting, stomach pain, diziness, hair loss, depression, flatulence, abdominal pain, bloating, muscle pain and discomfort, joint pain, an irritated or runny nose, cough, indigestion, gastir reflux and loss of appetite, fever, anxiety Rare: Allergic (hypersensitivity) reaction, lactic acidosis (too much lactic acid in the blood), suicidal thoughts and behaviours, liver failure	Take with or without food	
Dolutegravir/ lamivudine	Dovato	SV 137	Tablet comprising 50mg dolutegravir and 300mg lamivudine	One tablet once a day	1	Common: Headache, dizziness, drowsiness, tiredness, depression, anxiety, difficulty in sleeping, abnormal dreams, nausea, diarrhoea, abdominal pain, vomiting, flatulence, increased liver enzymes or creatinine phosphokinase, rash, itching, hair loss, muscle and joint pains Rares is udid althoughts, liver failure, lactic acidosis (too much lactic acid in the blood), hypersensitivity (allergic) reaction (severe rash, fever, weakness, facial swelling)	Take with or without food	
Dolutegravir/rilpivirine	Juluca	SV J3T	Tablet comprising 50mg dolutegravir and 25mg rilpivirine	One tablet once a day	1	Common: Difficulty in sleeping, abnormal dreams, depression, depressed mood, anxiety, headache, dizziness, drowsiness, fatigue, nausea, diarnhoea, abdominal pain, vomiting, flatulence, dry mouth, decreased appetite, rash, fiching, increased liver enzymes or bilirubin or creatinine phosphokinase or ipsace or pancreatic amylase, decreased white blood cell count, hearnoolion or platelet count, increased total or LDL choisterol, increased trigly-cendes Raves Suicidal thoughts and behaviour, hypersensitivity reaction (severe rash, fever, weakness, facial swelling); liver failure	Take with a meal	
Doravirine/lamivudine/ tenofovir disoproxil	Delstrigo	\$776	Tablet comprising 100mg doravirine, 300mg lamivudine, 245mg tenofovir disoproxil	One tablet once a day	1	Common: Abnormal dreams, difficulty in sleeping, nightmare, depression, headache, dizziness, drowsiness, cough, an irritated or runny nose, nausea, diarrhoea, abdominal pain, vomiting, hair loss, rash, muscle disorders, fatigue, fever Rare: Lactic acidosis (too much lactic acid in the blood), suicidal thoughts, hepatitis, acute kidney failure or damage	Take with or without food	
Elvitegravir/cobicistat/ emtricitabine/tenofovir alafenamide	Genvoya	510	Tablet comprising 150mg elvitegravir, 150mg cobicistat, 200mg emtricitabine, 10mg tenofovir alafenamide	One tablet once a day	1	Common: Abnormal dreams, headache, dizziness, nausea, diarrhoea, vomiting, flatulence, rash, tiredness Rare: Depression, suicidal thoughts	Take with food	
Elvitegravir/cobicistat/ emtricitabine/tenofovir disoproxil	Stribild	1	Tablet comprising 150mg elvitegravir 150mg cobicistat 200mg emtricitabine 245mg tenofovir disoproxil	One tablet once a day	1	Common: Nausea, diarrhoea, vomiting, abnormal dreams, headache, fatigue, dizziness, insomnia, rash, itching, abdominal pain, bloating, flatulence, constipation, sieepiness, weakness, skin darkening, low white blood cell count, low blood phosphate levels, raised triglyceride and blood sugar levels, and raised liver enzyme, anytake, creatinion or creatine kinase levels. Rare: Lactic acidosis (too much lactic acid in the blood), kidney failure, suicidal thoughts and behaviours, liver failure, pancreatitis, allelegic (hyperarealitisty) reaction, severe raih	Take with food	
Rilpivirine/ emtricitabine/tenofovir alafenamide	Odefsey	GSI	Tablet comprising 25mg rilpivirine, 200mg emtricitabine, 25mg tenofovir alafenamide	One tablet once a day	1	Common: Difficulty in sleeping, abnormal dreams, depression, headache, dizziness, loss of appetite, nausea, abdominal pain, vomiting, dry mouth, indigestion, flatulence, diarrhoea, rash, tiredness, low white or red blood cell count, low platelet count, raised lipid or pancreatic enzyme or liver enzyme levies Rare: Severe rash and fever	Take with food	
Rilpivirine/ emtricitabine/tenofovir disoproxil	Eviplera	GSI	Tablet comprising 25mg rilpivirine, 200mg emtricitabine, 245mg tenofovir disoproxil	One tablet once a day	1	Common: Raised cholesterol and triglyceride levels, loss of appetite, depression, sleep disorders, abnormal dreams, sleepiness, nausea, vomiting, diarnhoea, dizziness, insomnia, headache, weakness, rash, liching, abdorninal pain, dry mouth, fatigue, bloating, flatulence, changes in kidney function, naised liver enzyme, amylase and creatine kinase levels, low blood phosphate levels, skin darkening, low white blood cell count Rare: Lactic acidosis (too much lactic acid in the blood), kidney failure	Take with food	





- Cabotegravir (INSTI)
 - + rilpivirine (NNRTI)
- Injectable every 1 or 2 months

Updated Treatment Recommendation on Use of Cabotegravir and Rilpivirine for People With HIV From the IAS-USA Guidelines Panel

Paul E. Sax, MD¹; Melanie A. Thompson, MD²; Michael S. Saag, MD³; et al

> Author Affiliations | Article Information

JAMA. 2024;331(12):1060-1061. doi:10.1001/jama.2024.2985



Capsid Inhibitors

- Lenacapavir (Sunlenca)
- After loading dose, q 6 months SQ injection
- Heavily treatment experienced
- Paired with optimized background regimen

Entry Inhibitors

- Ibaluzimab (Trogarzo)
- After a loading dose, q 2 week infusion
- Heavily treatment experienced
- Paired with optimized background regimen

https://www.hiv.uw.edu/page/treatment/drugs



- Once weekly oral treatment regimens?
- Lenacapvir +bNAbs
- Long acting injectables (>6 months?)
- Implants?



Carstens RP et al. Single dose administration of MK-8527, a novel nRTTI, in adults with HIV-1. CROI, abstract 115, 2024.

Gillespie G et al. Safety and pharmacokinetics of MK-8527, a novel nRTTI, in adults without HIV CROI abstract 129, 2024.

Fichtenbaum CJ et al. Antiviral activity, safety, and pharmacokinetics of GS-1720: a novel weekly oral InSTI. CROI, abstract 116, 2024.



6. We have the tools to END the epidemic.



Diagnose all people with HIV as early as possible.

Treat people with HIV rapidly and effectively to reach sustained viral suppression.





Prevent new HIV transmissions by using proven interventions, including pre-exposure prophylaxis (PrEP) and syringe services programs (SSPs).

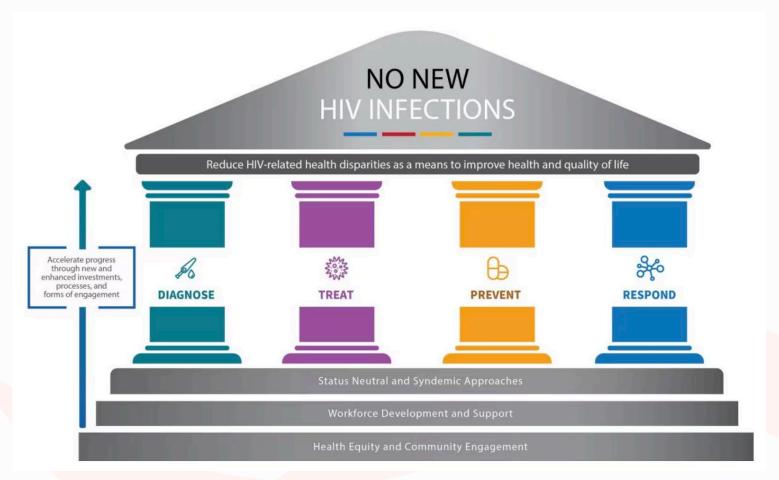
Respond quickly to potential HIV outbreaks to get needed prevention and treatment services to people who need them.



https://www.cdc.gov/ehe/php/about/index.html



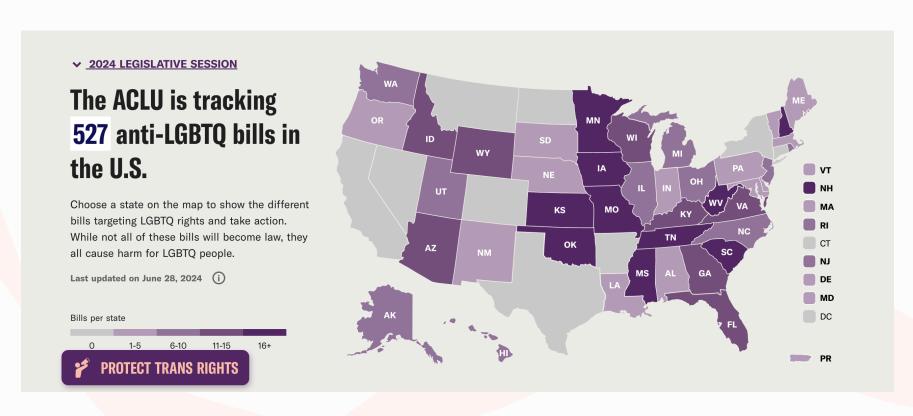
6. We have the tools to END the epidemic.



https://www.cdc.gov/hiv/division-of-hiv-prevention/strategic-plan/dhp-cross-cutting-focus-areas-and-the-strategic-framework.html



7. Yet barriers still exist, and policies are making this harder than it needs to be.



https://www.aclu.org/legislative-attacks-on-lgbtq-rights-2024



7. Yet barriers still exist and policies are making this harder than it needs to be.

Tennessee's Rejection of \$8.8 Million in Federal Funding Alarms H.I.V. Prevention Groups

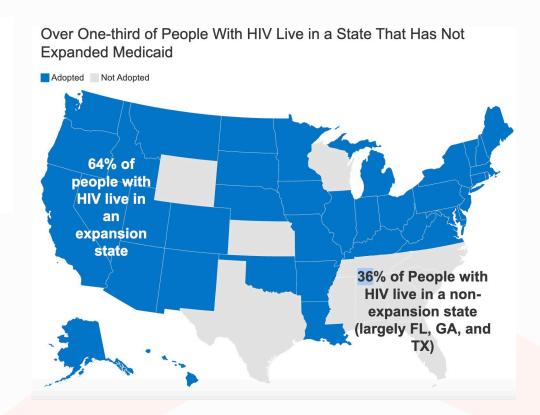
The state plans to use state funds, which a spokeswoman for Gov. Bill Lee said would be more efficient than receiving federal dollars. Some organizations are concerned they will be cut off if they don't align with his conservative politics.

NEWSFEED

Court Mostly Upholds Coverage of PrEP and Preventive Health Care, for Now

A federal appeals court ruled that eight employers don't have to cover certain preventive health care, but is future coverage for all at risk? Learn more at a Zoom townhall.

June 25, 2024 · By Trent Straube



https://www.kff.org/hivaids/issue-brief/medicaid-and-people-with-hiv/Poz.com



So Let's All....



- Inquire about and offer PrEP in a welcoming environment
- Reduce stigma
- Diagnose and treat early
- Support SSPs and harm reduction
- Recognize syndemics
- Housing, mental health care,
 SUD treatment
- Fight against unjust laws and policies
- END THIS THING

