UNMC HIV ECHO Session 1

Welcome!

- The University of Nebraska Medical Center's Specialty Care Center welcomes you to our first **HIV ECHO** (extensions of health outcomes) – **"HIV 101"**
- Today's Subject Matter Expert's (SME's) are Dr. Nada Fadul, Dan Cramer APRN, and guest SME's Laura Krajewski and Nakiea Boetger
- HIV ECHO Facilitator: Heather Saarela
- HIV ECHO sessions are held the first Thursday of every month except Jan/July 2025

UNMC HIV ECHO 1st Session Agenda

- Welcoming and housekeeping
- Dr. Nada Fadul to present “HIV 101” which will cover HIV epidemiology, the history of HIV, HIV in Nebraska, HIV testing, and much more!
- Dan Cramer will follow to present today’s Case Study
  - Nakiea Boetger and Laura Krajewski attending as guest Subject Matter Experts
  - Feel free to hop in the chat with any questions or comments ☺

Housekeeping Reminders:

We love discussion!

Please stay muted unless you are speaking.

We love to see your face!

Sessions will be recorded with links available later.

End of session surveys will be available.

HIV 101

Nada Fadul, MD, FIDSA

Assistant Dean, Diversity, Equity and Inclusion

Medical Director, Specialty Care Center

Division of Infectious Diseases

Learning Objectives

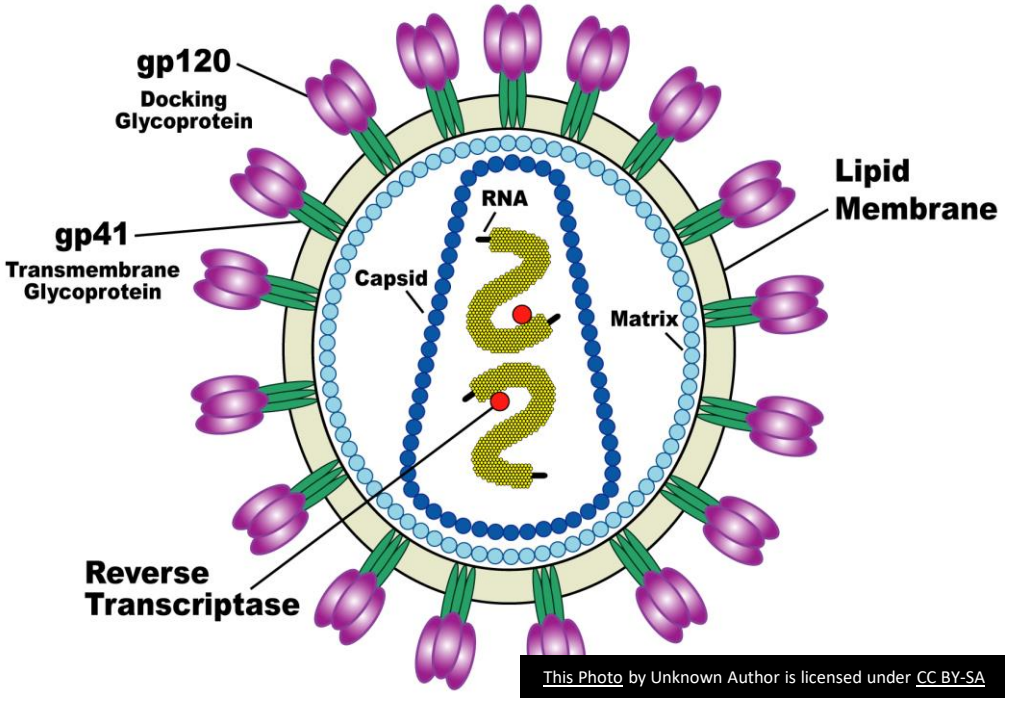
- At the completion of the session, participants will be able to:
  - Describe the origin of HIV infection
  - List the major modes of HIV transmission
  - Identify the key points in the life cycle of HIV
  - Recognize the complications of untreated HIV infection

History of HIV

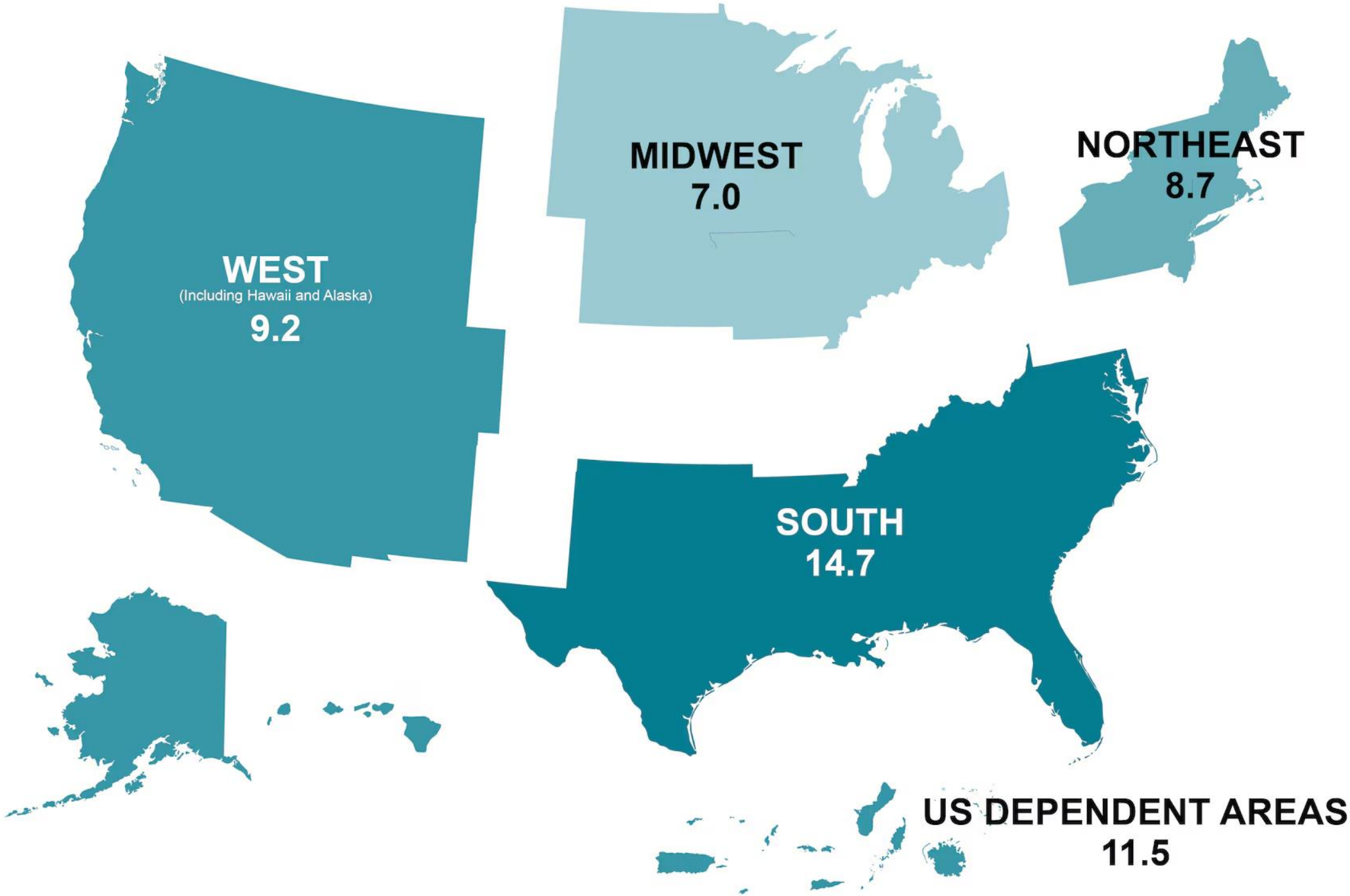
- 1981: unusual cluster of cases of Pneumocystis Carinii Pneumonia and Kaposi's sarcoma in previously healthy homosexual males (*Gay Related Immunodeficiency GRID*)
- 1983: identification of a cytopathic retrovirus
- 1985: development of a diagnostic serologic test for HIV-1
- 1987: introduction of first antiretroviral drug AZT
- 1996: highly active antiretroviral therapy (HAART)
- 2000: mortality, AIDS, AIDS-defining diagnoses, and hospitalizations all decreased 80%

What is Human Immunodeficiency Virus (HIV)

- Family *Retroviridae*, genus *Lentivirus*
- Two major types:
  - **HIV-1 -** Responsible for the global pandemic (95% of infections worldwide)
    - 4 genotypes: **M (main)**, N, O and P
      - 11 subtypes or clades (A-K)
        - **Subtype B** is the dominant subtype in the Americas and W. Europe (only 12% of global infections)
  - **HIV-2 -** Less pathogenic, largely restricted to W. Africa



HIV Epidemiology


WEST
(Including Hawaii and Alaska)
9.2
MIDWEST
7.0
NORTHEAST
8.7
SOUTH
14.7
US DEPENDENT AREAS
11.5

Knowledge of HIV status in the US, 2022*

In 2022, an estimated **1.2 million people** had HIV.

For every 100 people with HIV

87 knew their HIV status.

* Data not available for children aged 12 and under.

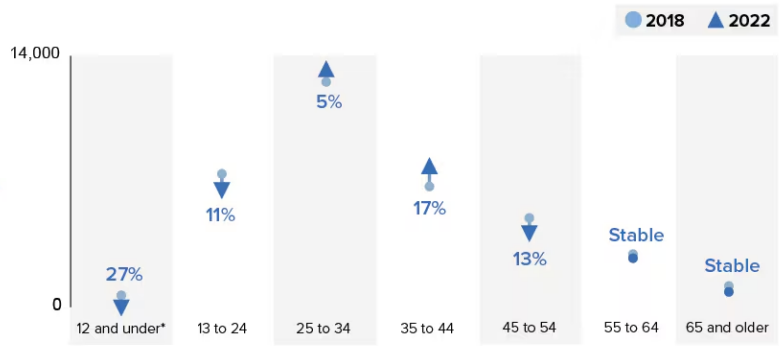
Source: CDC. Estimated HIV incidence and prevalence in the United States, 2018–2022. *HIV Surveillance Supplemental Report*, 2024; 29(1).

Ending the HIV Epidemic

Overall Goal: Increase the estimated percentage of people with HIV who have received an HIV diagnosis to at least 95% by 2025 and remain at 95% by 2030.

Trends in HIV diagnoses in the US and 6 territories and freely associated states by age, 2018-2022

Trends by Age

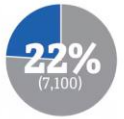


* Changes in subpopulations with fewer HIV diagnoses can lead to a large percentage increase or decrease.

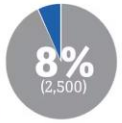
Source: CDC. Diagnoses, deaths, and prevalence of HIV in the United States and 6 territories and freely associated states, 2022. *HIV Surveillance Report*, 2022;35.

There were **32,100 estimated new HIV infections** in the US in 2021. Of those:

70% (22,400) were among gay, bisexual, and other men who reported male-to-male sexual contact*



22% (7,100) were among people who reported heterosexual contact

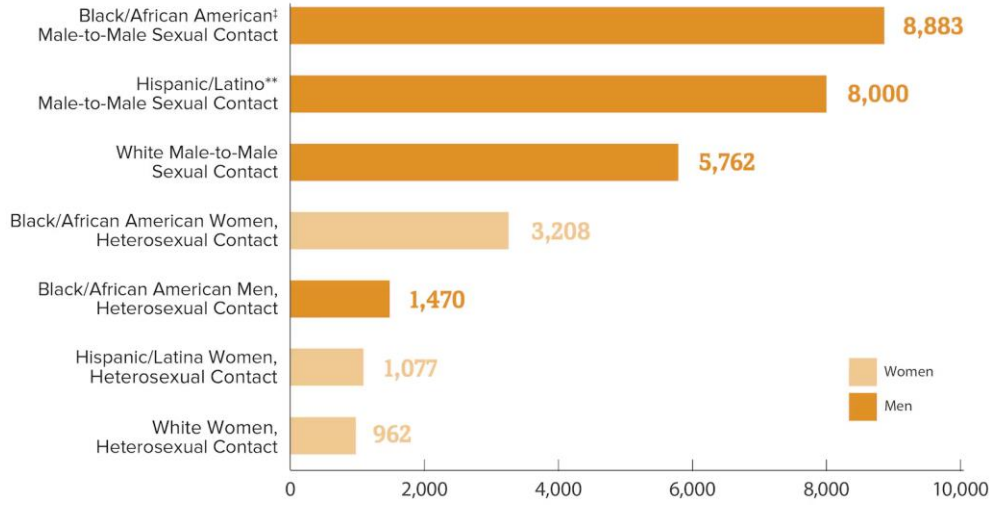


8% (2,500) were among people who inject drugs

Ending the HIV Epidemic

Overall Goal: Decrease the estimated number of new HIV infections to 9,300 by 2025 and 3,000 by 2030.

Gay and bisexual men are the population most affected by HIV.



HIV in Nebraska

2,384 People living with HIV in Nebraska, 2021

Efforts to improve awareness and reduce new infections are critical to ending the HIV epidemic. Understanding HIV at the local level better equips communities to develop targeted HIV prevention and treatment efforts.

Here is a high-level overview of the HIV epidemic in **Nebraska**:

PREVALENCE RATE

147 cases/100K, 2021

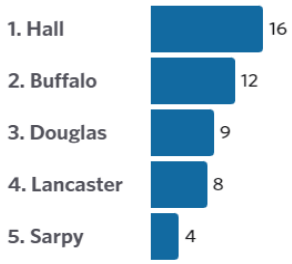
0.2% of people living with HIV in the nation are in this location

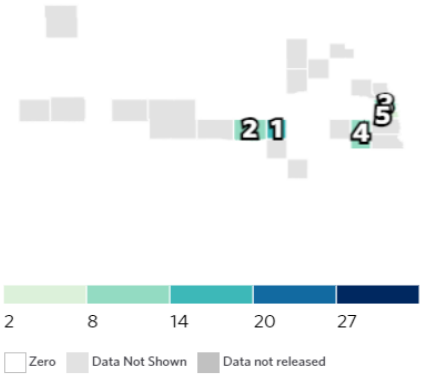
NEW DIAGNOSES RATE

7 cases/100K, 2021

0.3% of people newly diagnosed with HIV in the nation are in this location

TOP AREAS: NEW DIAGNOSES RATE PER 100K, 2021





PROPORTION OF CASES BY TRANSMISSION CATEGORY, 2021

	PREVALENCE		NEW DIAGNOSES	
MALE CATEGORIES	PROPORTION	CASES	PROPORTION	CASES
Male-to-Male Sexual Contact	74.6%	1,392	72.4%	63
Male-to-Male Sexual Contact & Injection Drug Use	9.1%	169	12.6%	11
Injection Drug Use	5.4%	101	10.3%	9
Heterosexual Contact	9.1%	170	4.6%	4
Other/Unknown*	1.8%	34	0.0%	0

FEMALE CATEGORIES	PROPORTION	CASES	PROPORTION	CASES
Injection Drug Use	14.9%	77	27.8%	5
Heterosexual Contact	81.3%	421	72.2%	13
Other/Unknown*	3.9%	20	0.0%	0

HIV Transmission

Estimated Per-Act Probability of Acquiring HIV from an Infected Source, by Exposure Act*

Type of Exposure	Risk per 10,000 Exposures
Parenteral	
Blood Transfusion	9,250
Needle-Sharing During Injection Drug Use	63
Percutaneous (Needle-Stick)	23
Sexual	
Receptive Anal Intercourse	138
Insertive Anal Intercourse	11
Receptive Penile-Vaginal Intercourse	8
Insertive Penile-Vaginal Intercourse	4
Receptive Oral Intercourse	Low
Insertive Oral Intercourse	Low
Other^	
Biting	Negligible
Spitting	Negligible
Throwing Body Fluids (Including Semen or Saliva)	Negligible
Sharing Sex Toys	Negligible

* Factors that may increase the risk of HIV transmission include sexually transmitted diseases, acute and late-stage HIV infection, and high viral load. Factors that may decrease the risk include condom use, male circumcision, antiretroviral treatment, and pre-exposure prophylaxis. None of these factors are accounted for in the estimates presented in the table.

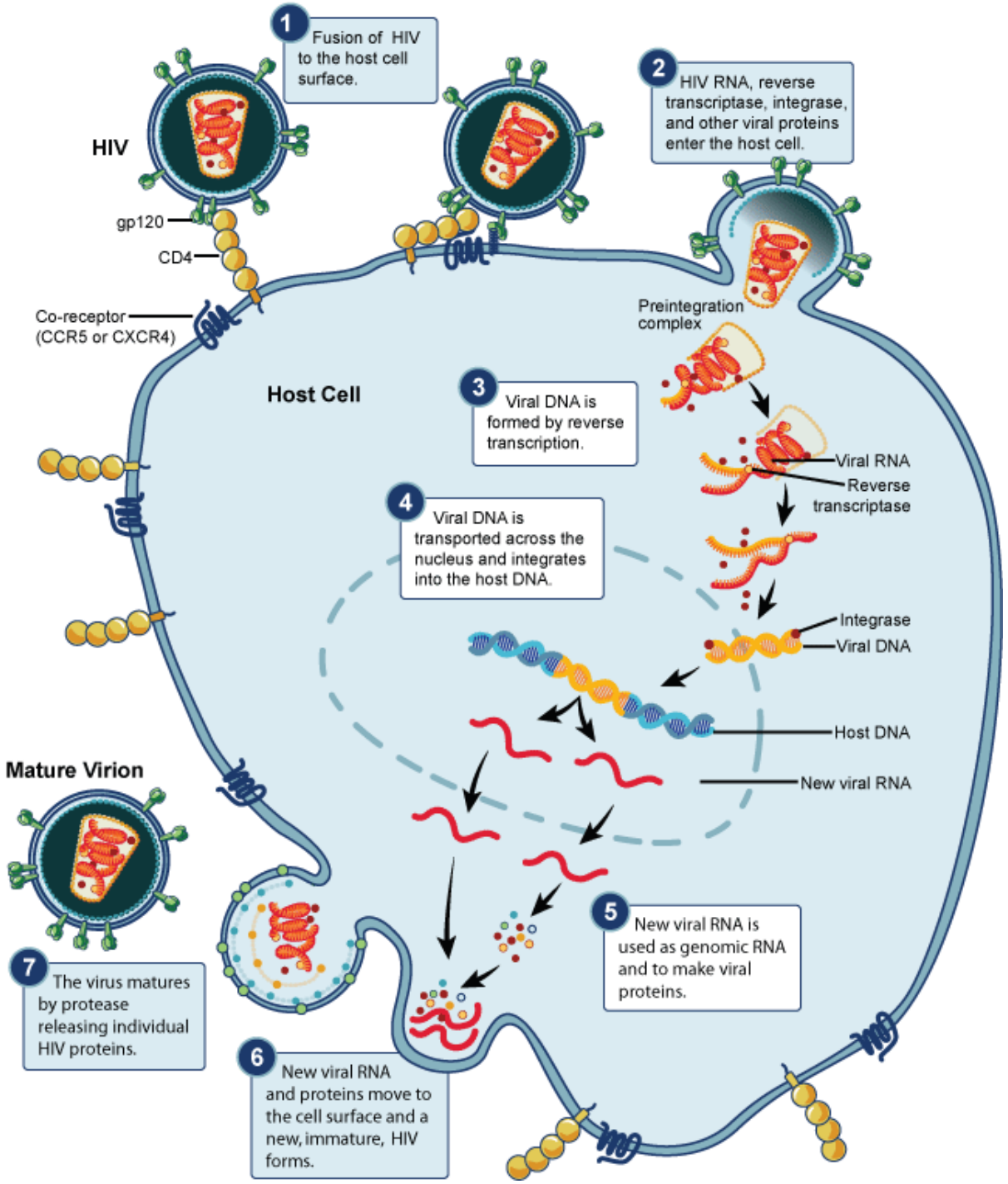
^ HIV transmission through these exposure routes is technically possible but unlikely and not well documented.

Social determinants of health (SDoH)

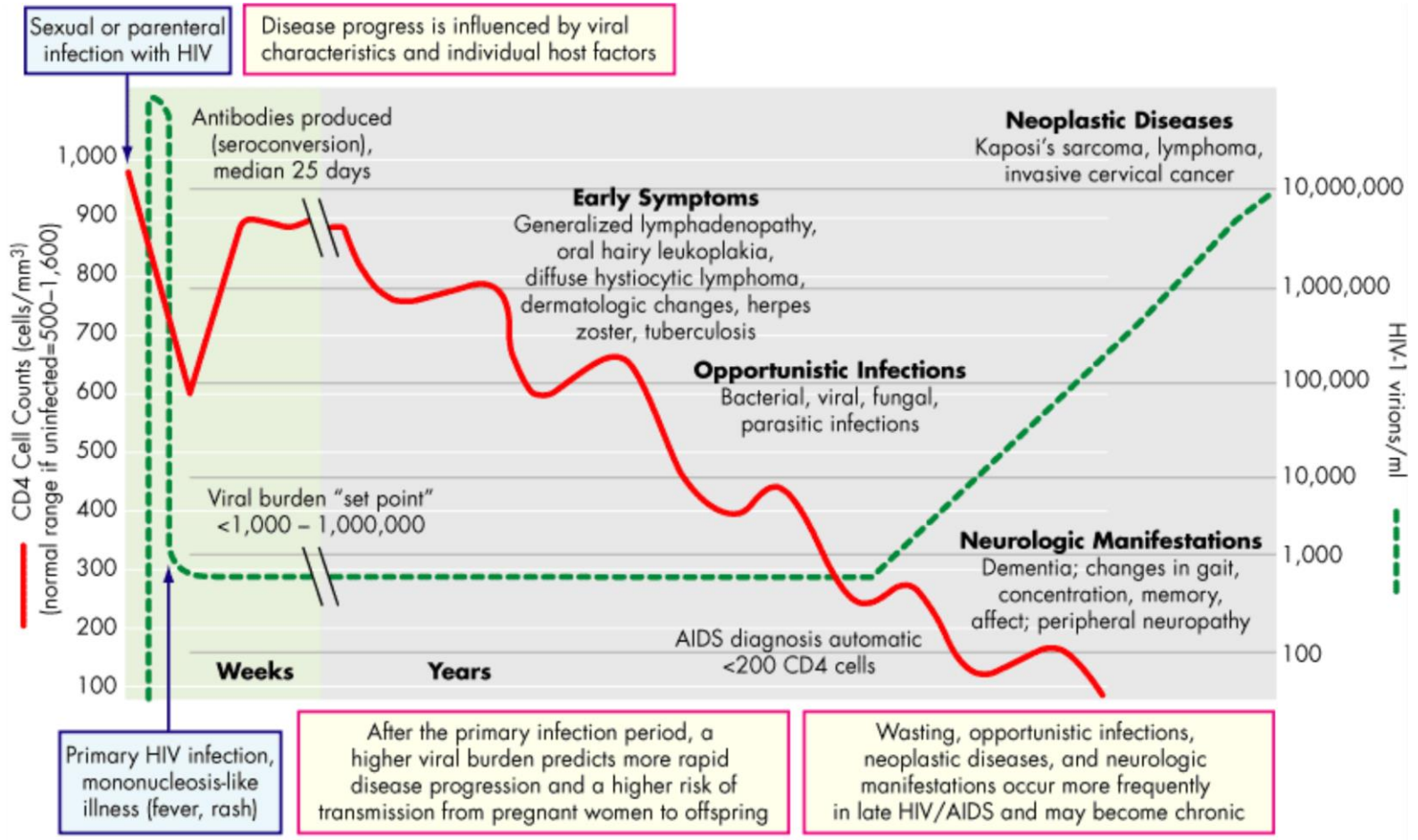
- Conditions in the environments that affect a wide range of health, functioning, and quality-of-life outcomes and risks.
- Have a major impact on people's health, well-being, and quality of life. Examples of SDOH include:

  - Safe housing, transportation, and neighborhoods
  - Racism, discrimination, and violence
  - Education, job opportunities, and income
  - Access to nutritious foods and physical activity
  - Polluted air and water
  - Language and literacy skills

Pathogenesis



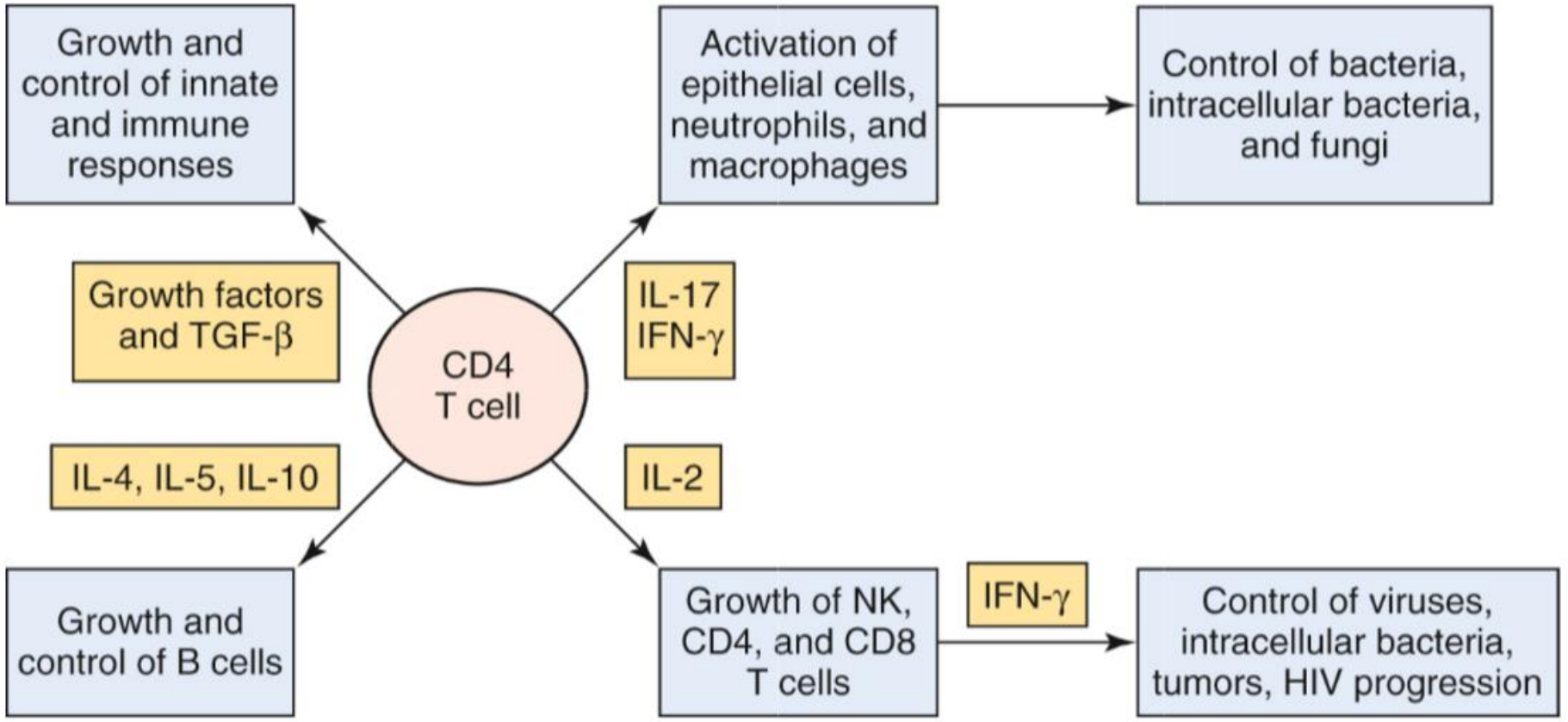
Credit: NIAID



Host Response

- Nonspecific host defenses fail to contain viral infection
- HIV has several ways of escaping immune control:
  - Rapid mutation rate → virus alters its antigenicity and thus escapes antibody clearance
  - Persistent infection of macrophages and resting CD4 T cells maintains virus in an immune-privileged cell
- Ultimately, infection of CD4 T cells compromises the entire immune system

Role of CD4 T cells in Immune Responses



Additional important points regarding HIV pathogenesis

HIV has a long latency period

On average, CD4 cell counts decline by about 50-100 cells/mm^3 per year

The HIV viral load (aka HIV RNA/ HIV PCR) is the biggest predictor of the rate of CD4 cell decline

HIV testing

Everyone deserves an HIV test if they have ever had sex regardless of their age or background

CDC recommends everyone 13-65 should get an HIV test

In practice you should not limit yourself to age or sex or “risk” but rather minimize vulnerability

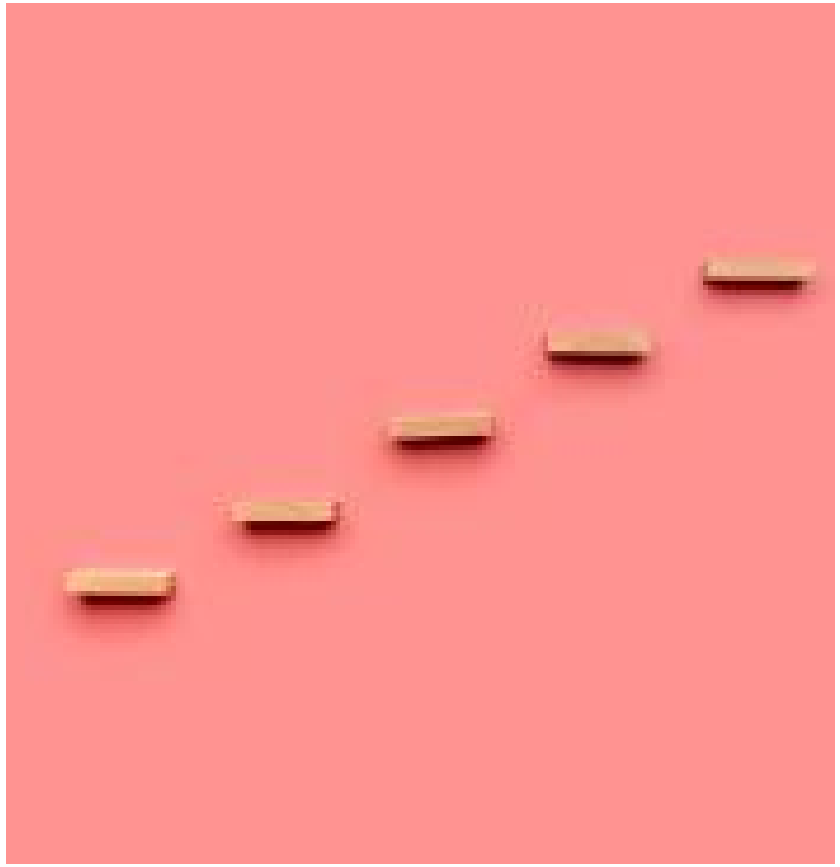
How many patients have you or your organization tested for HIV in the past year?

1. Zero
2. 1-10
3. 10-49
4. 50-99
5. >100

Clinical Presentations

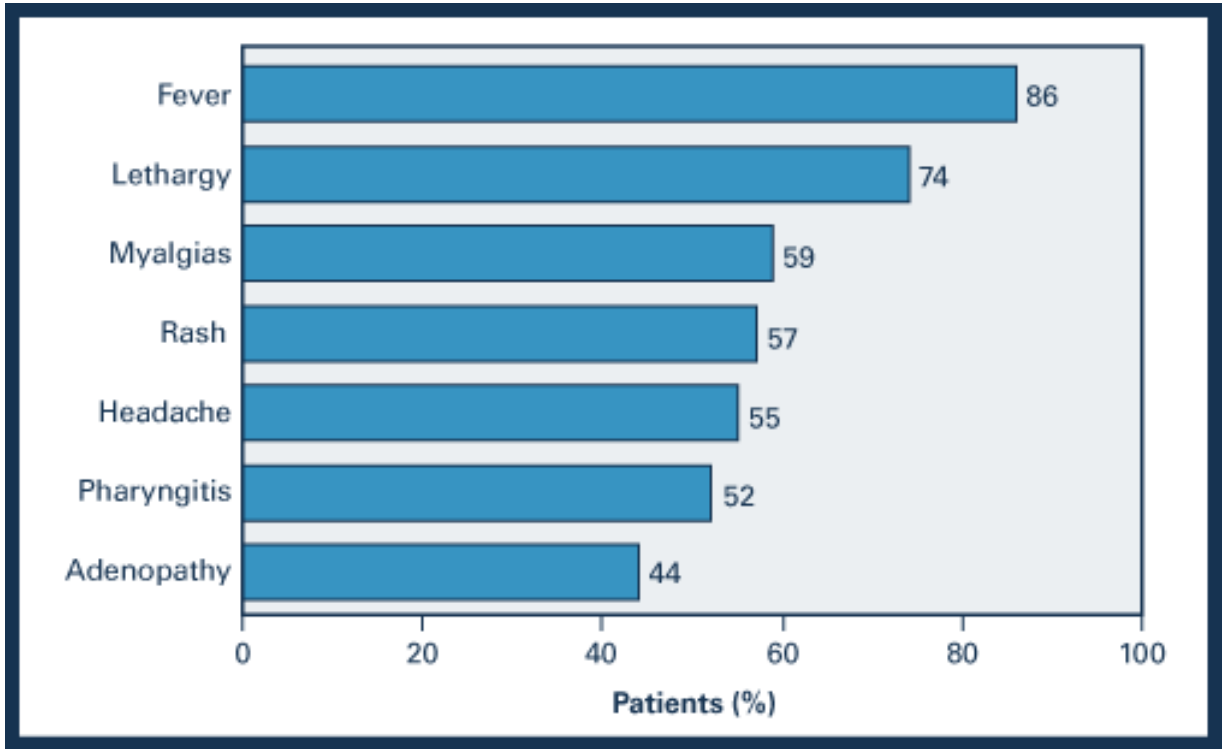
Stages of HIV-1 Infection

- Viral transmission
- Primary HIV infection (acute HIV)
- Seroconversion
- Clinical latent period
- Early symptomatic HIV
- AIDS
- Advanced HIV (CD4 cell count <50/mm^3)



Acute HIV

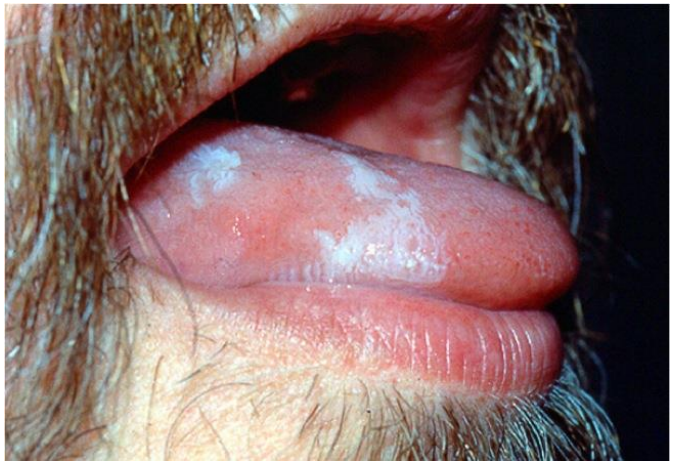
- 40-90% develop symptoms
  - Mono-like illness
- Self-limited
- Differential diagnosis:
  - Epstein Barr Virus (EBV)
  - Cytomegalovirus (CMV)
  - Syphilis



Vanhems P, et al., Seattle and Sydney. AIDS. 2000;14:375-81.

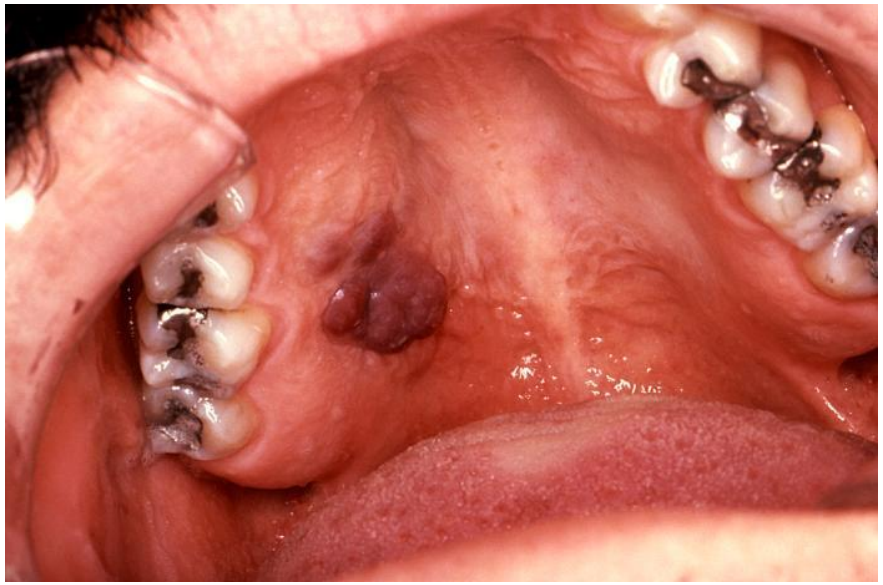
Early signs/symptoms: any CD4 cell count

- Generalized lymphadenopathy
- Oral hairy leukoplakia (white painless plaques, CANNOT be scraped off, due to EBV)
- Seborrheic dermatitis
- Herpes zoster (aka shingles)
  - Recurrent zoster is uncommon and should raise concern for underlying HIV or other immunocompromised state



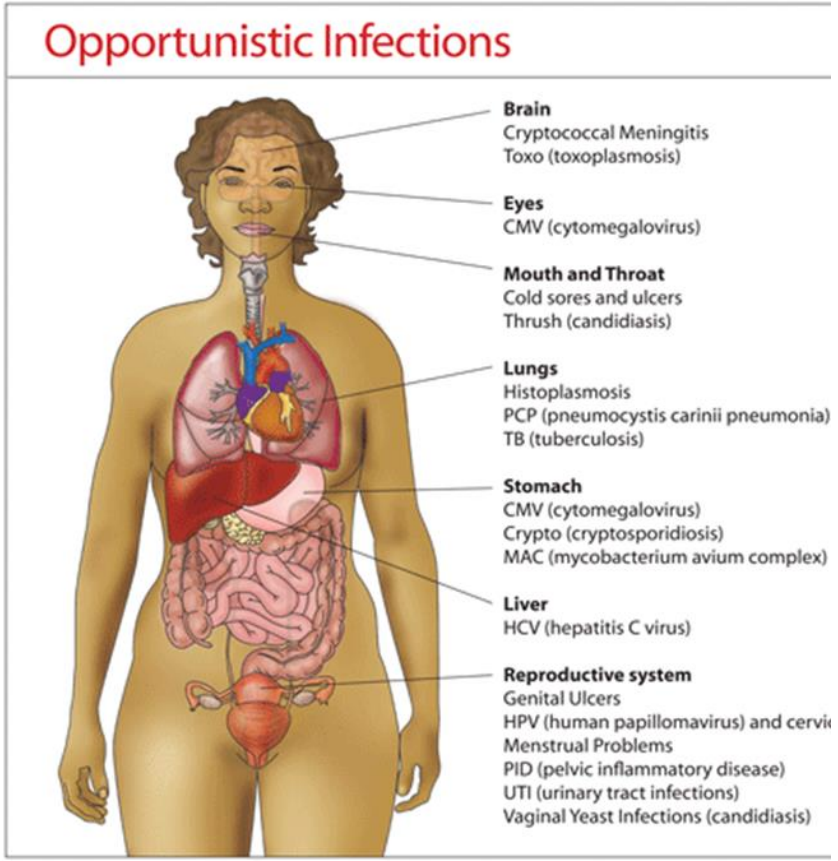
Kaposi Sarcoma

- Endothelial neoplasm that usually occurs as skin or oral lesions but may involve the internal organs
- Associated with human herpesvirus type 8 (HHV-8)
- Typically seen with advanced immunosuppression, but can occur at any CD4 cell count



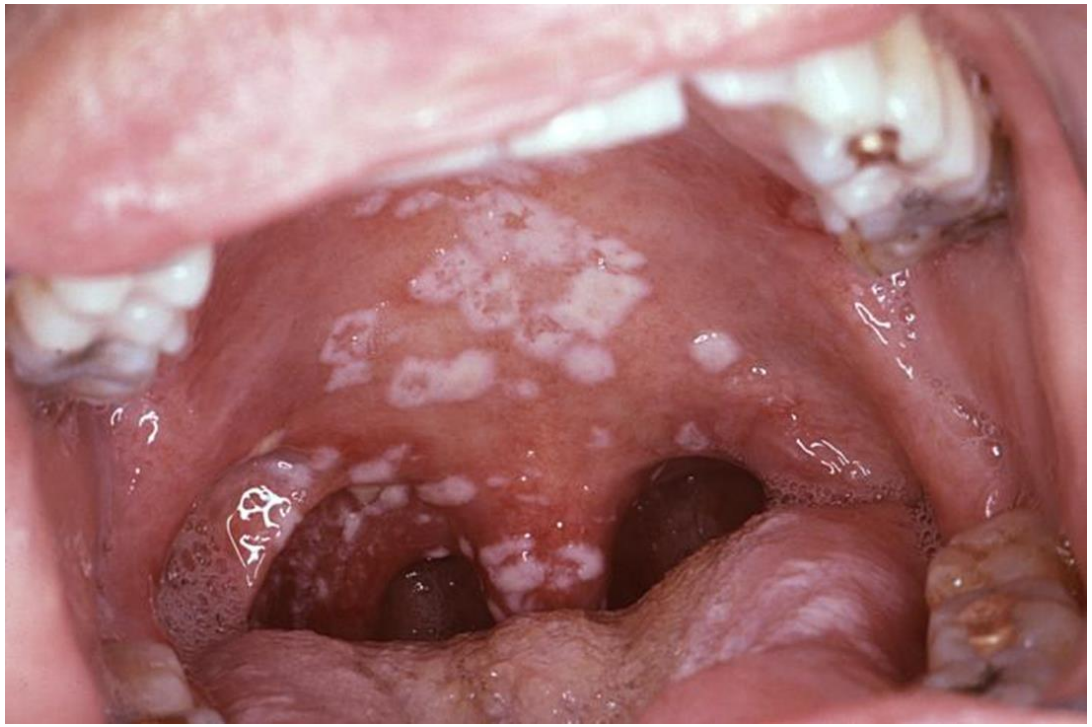
Opportunistic Infections: CD4 < 200

- *Candida albicans* → Mucocutaneous candidiasis
- *Pneumocystis jirovecii* → *Pneumocystis* pneumonia (PCP)
- JC virus (reactivation) → Progressive multifocal leukoencephalopathy (PML)
- *Toxoplasma gondii* → Toxoplasmic encephalitis



Mucocutaneous candidiasis

- *Candida albicans*
- CD4 < 200: Oropharyngeal candidiasis (thrush)
    - Painless, creamy white, plaque-like lesions that can be easily scraped off
- CD4 < 100: Esophageal candidiasis (esophagitis)
    - Odynophagia, dysphagia



Pneumocystis Pneumonia (PCP)

- *Pneumocystis jirovecii*
- Ubiquitous organism; classified as a fungus but shares biologic characteristics with protozoa
- Taxonomy:
  - *Pneumocystis carinii* infects rats
  - *Pneumocystis jirovecii* infects humans
- 90% of cases occur in patients with CD4 cell counts <200 cells/mm^3

Opportunistic Infections: CD4 <100

- *Cryptococcus neoformans* → cryptococcal meningitis
- *Histoplasma capsulatam* → disseminated histoplasmosis
- CMV → retinitis, esophagitis, colitis, pneumonitis, encephalitis
- EBV → B-cell lymphoma (e.g. non-Hodgkin's lymphoma, CNS lymphoma)
- *Mycobacterium avium* complex (MAC) → disseminated MAC

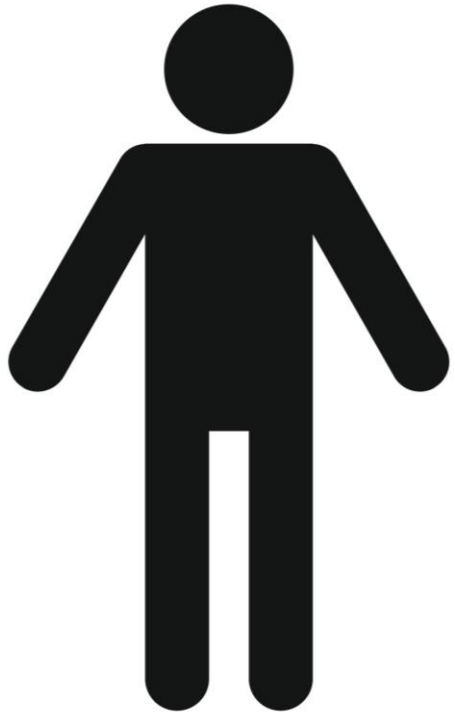
ECHO Session 1 Case Discussion

Presenter: Dan Cramer MSN, APRN, FNP-C

Missed Diagnosis/Linkage to care

Case Discussion

- 20-year-old male with no pertinent past medical history presented to Urgent care for:
  - Full Body rash
  - Diffuse Myalgias
  - Fever up to 103F
  - Sore throat



Case Discussion

Lab work notable for:

- AST 87 (10-40)
- ALT 211 (12-78)
- Alk Phos 395 (33-138)
- Bili 0.4 (0-1.5)

Mono spot and COVID testing was negative

Patient was given 1.2 MU of IM PCN for possible Strep throat and no other testing was completed.

Case Discussion

3 Years later, patient presents to ED with rectal pain.

Found to have perirectal abscess on imaging

Underwent incision and drainage.

While in OR found to have extensive anal condyloma

As part of the workup, syphilis and HIV testing were sent.

HIV 4th generation positive for HIV 1 Ab, confirmatory differentiation assay positive as well.

Syphilis work up was positive

Case Discussion

Patient likely had secondary syphilis and possibly HIV three years prior at Urgent Care Clinic.

Should have been screened for STDs as a sexually active 20 year-old.

Partially treated for syphilis with 1.2 MU IM Penicillin

Case Discussion Panel

Laura Krajewski

- Patient Outreach Specialist at Specialty Care Center

Nakiea Boetger

- Disease Investigator/HIV Surveillance at Douglas County Health Dept.

Case Discussion

What other differential diagnoses should have been considered at initial visit with urgent care?

What patient information would have been important to collect at initial visit with urgent care?

What barriers are you encountering in your practice in terms of HIV testing?

Thank you for joining UNMC's first ID HIV ECHO Session!

Upcoming Session: "HIV Prevention in Primary Care" presented by Jenn Davis, MD. This session will be held on 12/5/24 at 12PM CST.

Interested in collaborating with us as a Subject Matter Expert or presenter? We would love to have you join us. Feel free to reach out to us at: UNMCHIVECHO@unmc.edu.

After session-feedback survey will be available as a link in the chat as well as on our ECHO website! We are also building a website specifically for our ECHO program. ☺