

# HIV: Intro., Treatment as Prevention, and the HIV Care Continuum

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**Planned posting of this presentation:**

<http://www.beyondaids.org/resources.html>

<http://www.academia.edu>



# Characteristics, course of HIV

- RNA retrovirus: human immunodeficiency virus
  - Identified 1983, antibody test 1985, good treatments since 1996, no cure
  - Makes genetic DNA copy which integrates with chromosomal material of cell, helping to replicate virus when cell replicates
  - Reservoirs in lymph tissue and brain
  - Takes a prolonged course: brief acute phase and long chronic phase, asymptomatic for first years, gradual deterioration (AIDS)
  - Transmitted by sexual activity, blood, and certain other body substances
- Effects on immune system
  - Particularly attacks T cells with CD4 receptors, important in immune function, so body loses ability to fight off other organisms
  - Chronic inflammation, contributing to CHD and other metabolic effects
  - Over course of years, without treatment, CD4 cell count drops with corresponding decline in immunity; opportunistic infections, cancers occur
- Neurological effects
  - Passes blood-brain barrier, riding inside macrophages; neurological effects include HIV-associated neurocognitive disorder (HAND)



# Status of the HIV Pandemic

(Sources: hiv.gov from CDC data; UNAIDS)

## ■ PREVALENCE (LIVING WITH HIV)

- US: 1.2 million (CDC estimate, 2019); about 87% aware of status
- GLOBAL: 37.6 million (of >77 million ever infected; UNAIDS estimates, 2020), 27.4 million being treated (73%); 84% aware of status

## ■ INCIDENCE/NEW DIAGNOSES PER YEAR)

- US and 6 dependent territories: 24,800 diagnoses (CDC, 2019), 9% decrease since 2015
  - 69% males who have sex with males, 36% black, 18% Latino, 23% heterosexual; rates highest in South. Age: highest rate 25-29, increasing 13-24 and 45-54
- GLOBAL: 1.5 million (estimated new infections, 2020; 30% decline since 2010
  - 53% females

## ■ ANNUAL DEATHS

- US: 15,815 reported 2019
- GLOBAL: 680,000 (WHO estimate, 2020); 47% decline since 2010
- TOTAL ESTIMATED GLOBAL DEATHS SINCE START OF PANDEMIC: **34.7 million**

# The AIDS Quilts

In 1987, the NAMES Project Foundation began a tradition of honoring persons who died of AIDS with hand-made quilts about their lives. Thousands of quilts are shown on display in 1992 in Washington, DC.

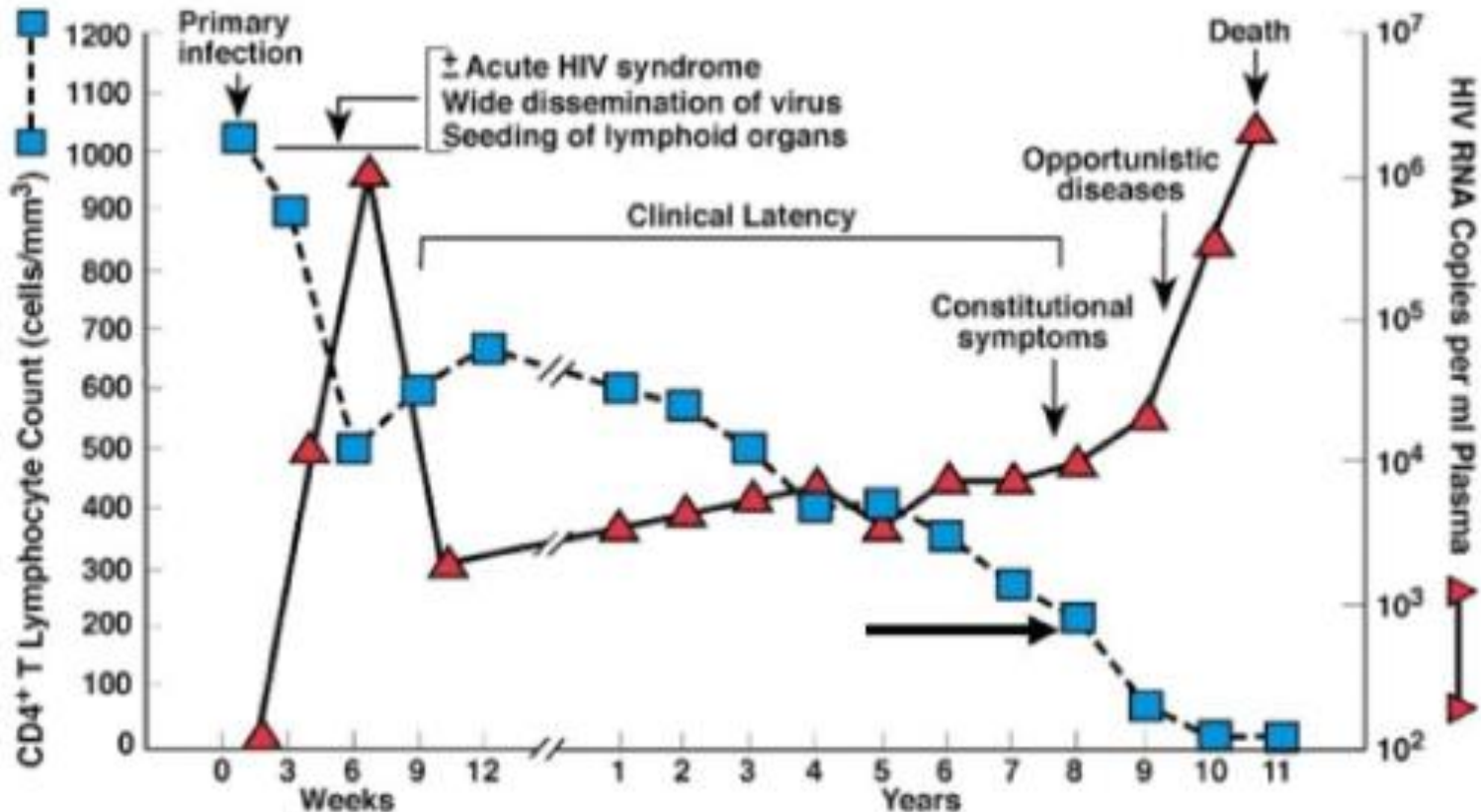
In 2004, sections of quilts were displayed at Loma Linda University for a World AIDS Day program. World AIDS Day has been observed annually globally since 1988; red ribbon is symbol.



# Natural course of untreated HIV

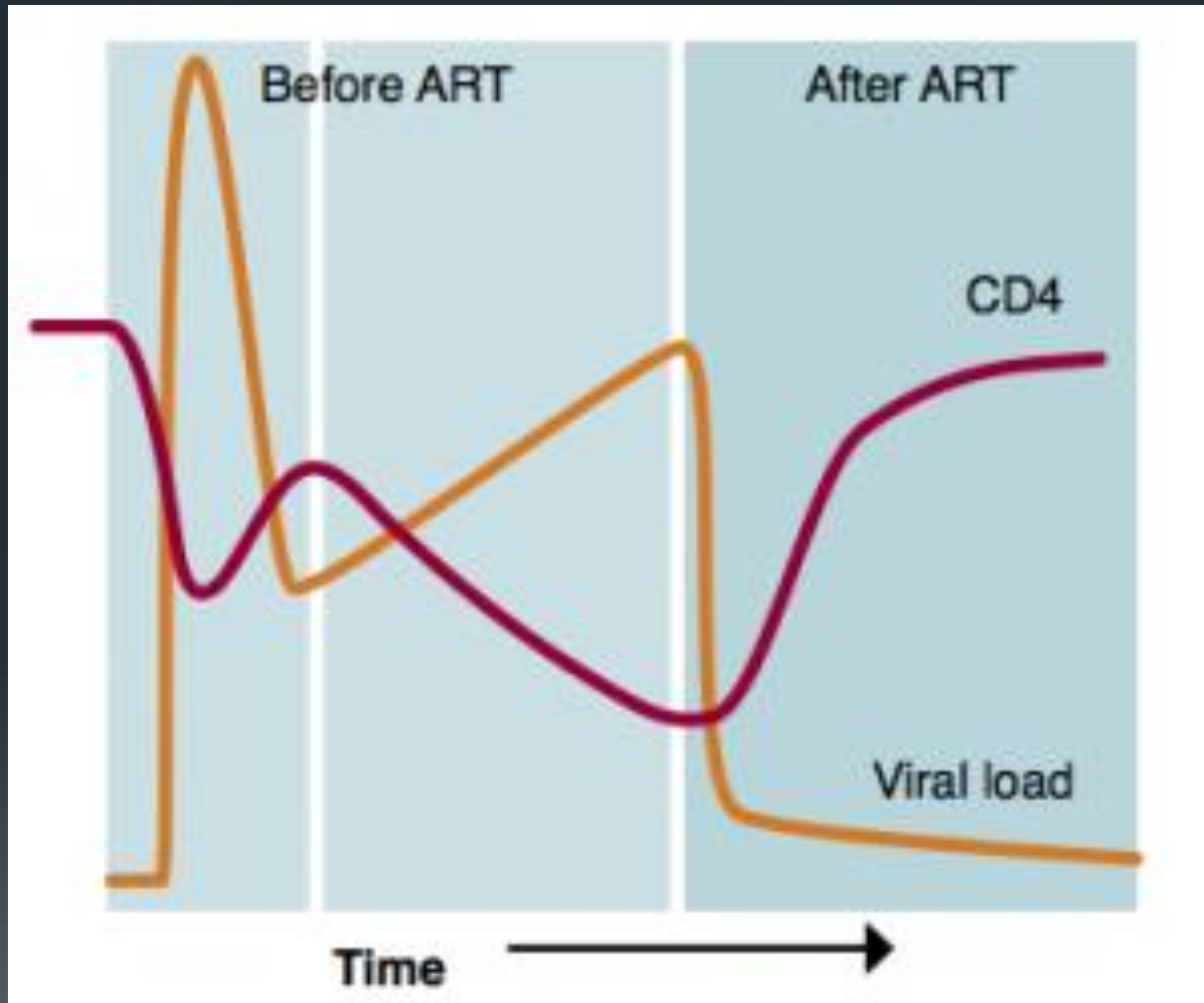
Blue=CD4 T cells, red=HIV RNA copies (viral load)

## Typical Course of HIV Infection



Modified From: Fauci, A.S., et al, *Ann. Intern. Med.*, 124:654, 1996

# Effect of treatment on course of HIV



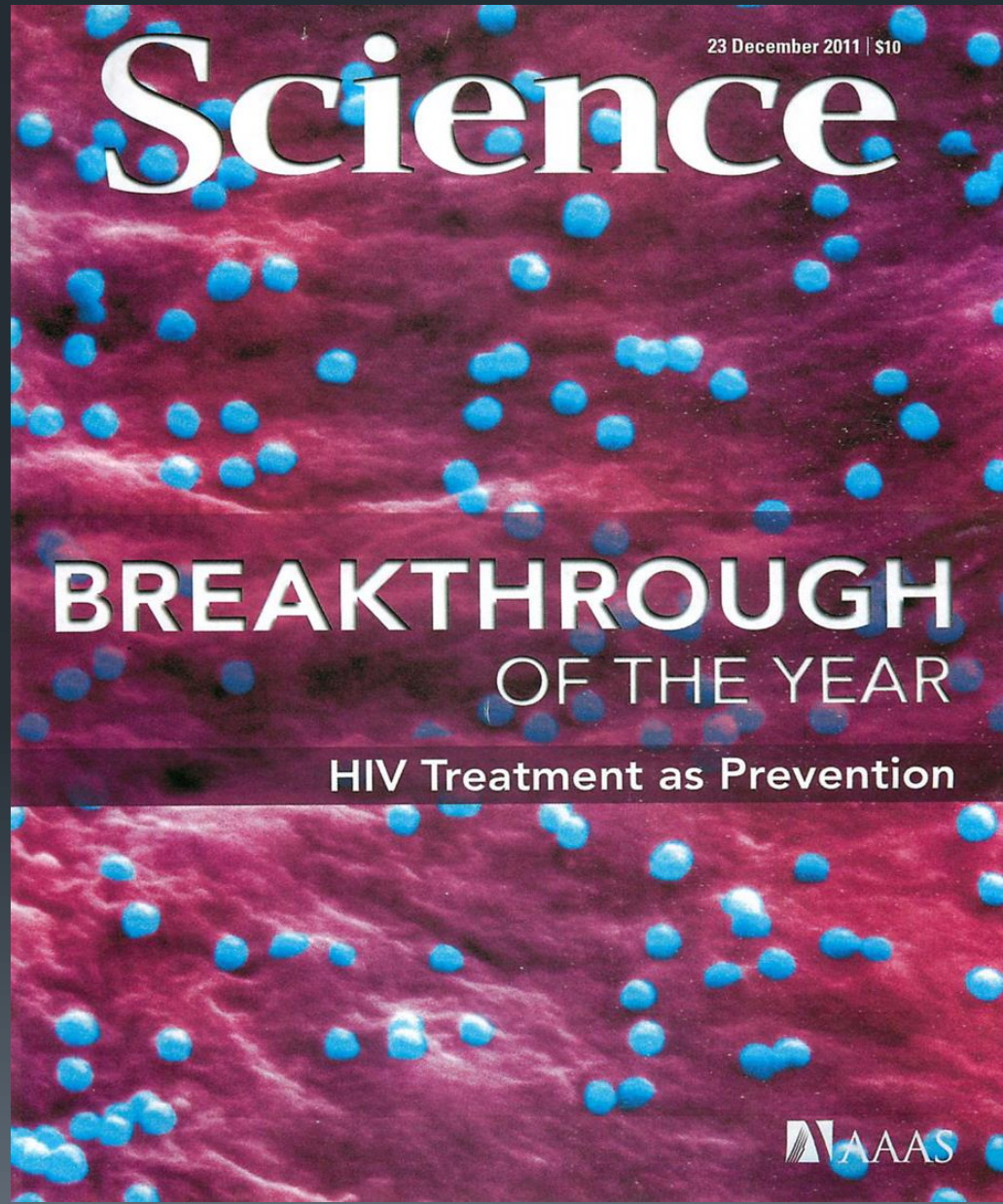
Source: iBase, 5/27/19

# The Concept of Treatment as Prevention; Applying It to HIV

- Treating the infected person to reduce infectiousness is the mainstay of treatment for TB, syphilis, other diseases
  - Killing organisms logically results in less shedding, less exposure of others
  - Requires prompt onset of treatment (before others already infected)
- Applying this to HIV had been proposed in 1996 by Hattis and Jason at the Loma Linda University Preventive Medicine residency (endorsed by CMA but went nowhere)
  - <http://www.beyondaids.org/articles/1996MA~1.PDF>
  - <http://www.beyondaids.org/articles/WillNewMedicationsReduceInfectiousnessofHIV-1997.pdf>
  - But from 2001-2011 that was contrary to treatment guidelines to delay till low CD4 cell count, making implementation impractical
- Research published 2011 confirmed that HIV medications can make HIV almost non-infectious if <200 copies/ml
  - “U=U” (undetectable = untransmittable), AIDS Society Conf., Paris, 7/17

# Science Magazine, Dec. 2011

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# Antiretroviral prophylaxis: a defining moment in HIV control

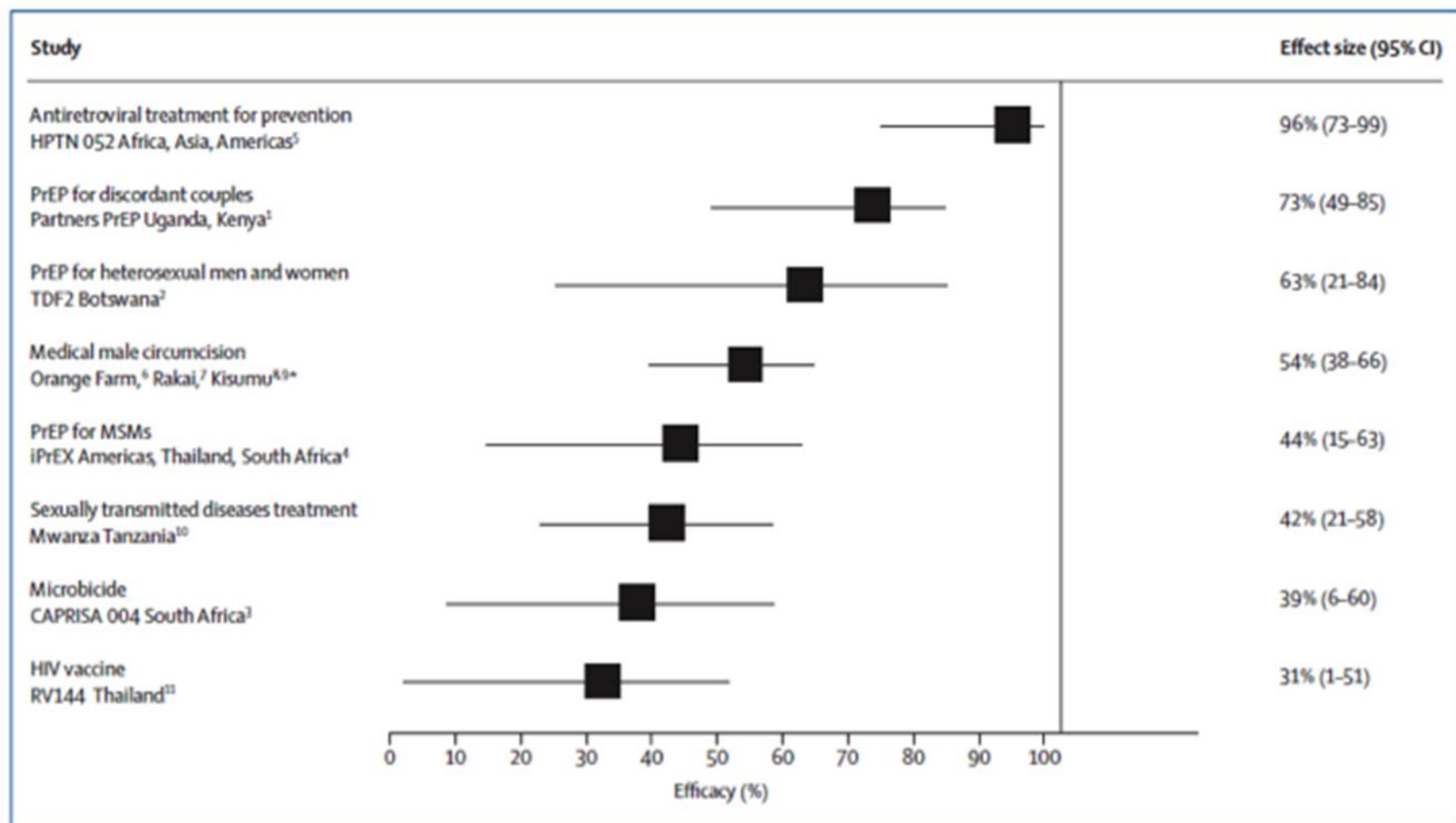


Figure: HIV prevention technologies shown to be effective in reducing HIV incidence in randomised controlled trials<sup>1-11</sup>

PrEP=Pre-exposure prophylaxis. \* Meta-analysis of circumcision trials.

# Origin of the HIV Care Continuum concept

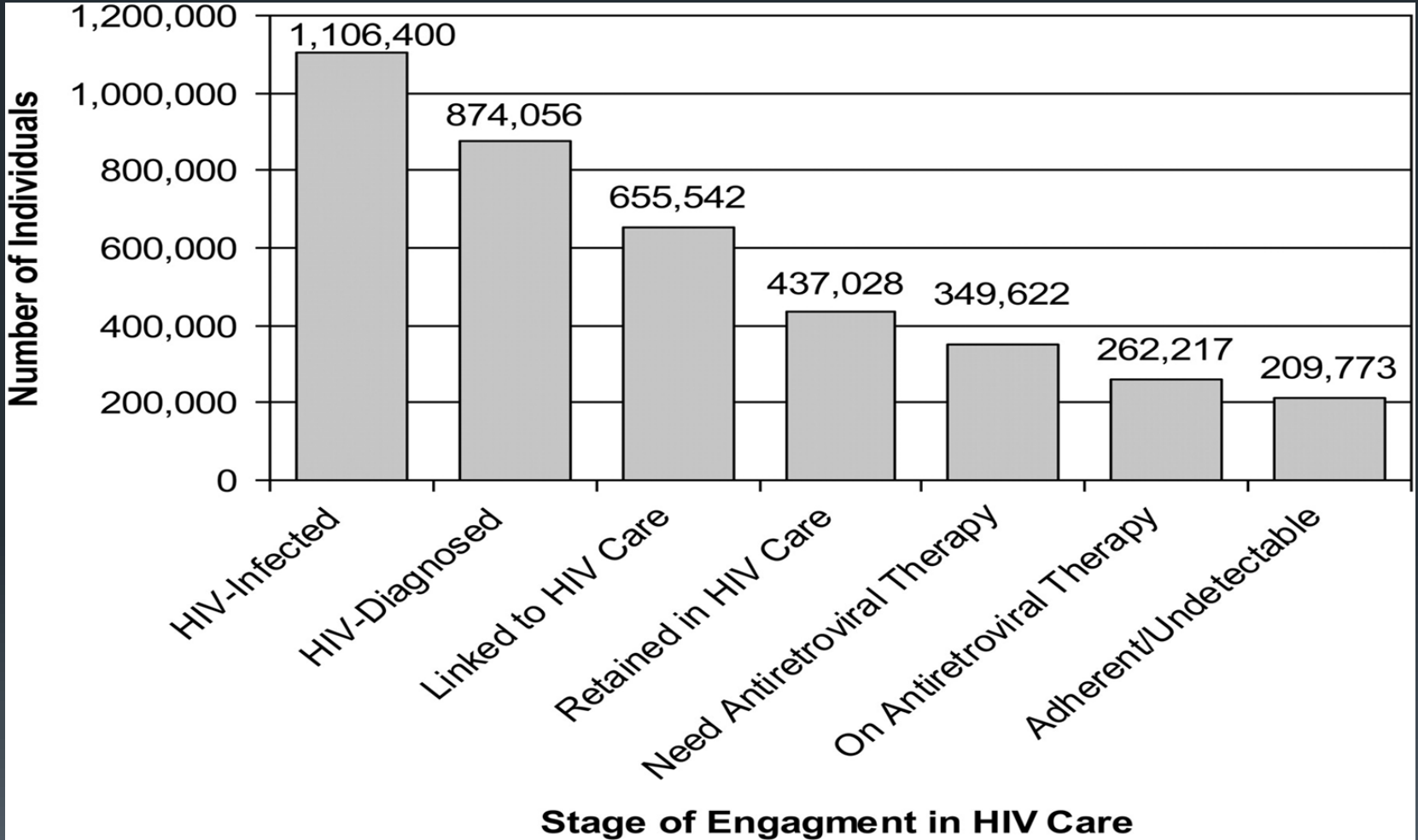
- In 2011, Dr. Edward Gardner in Denver (winner of the Beyond AIDS Foundation's "Nettie Award" for 2015) used previous studies to estimate dropouts at every stage of reaching viral suppression
- He estimated that at that time, only 19% of HIV-infected persons in the US had undetectable viral loads (since steadily increased but not at goals)
- Initially called "spectrum of engagement in care" or "treatment cascade," renamed the HIV Care Continuum

# HIV TREATMENT “CASCADE”

GARDNER, EM, et al., Clin Infect Dis. (2011) 52 (6):793-800

doi: 10.1093/cid/ciq243

Only 19% were estimated to have suppressed viral loads in 2011



# The HIV Care Continuum (HCC)

- Federal plan to increase percentages reaching viral suppression (renamed from Gardner's treatment "cascade")
- Involves following stages, each of which must be facilitated:
  - Screening for initial diagnosis
  - Linkage to care
  - Retention in care
  - Treatment with antiretroviral therapy (ART)
  - Achieving undetectable viral loads
  - Transmission actually decreases with each successive stage, not just at the final one

# 90-90-90: “An ambitious treatment target of UNAIDS”

- Along same idea but simpler, UNAIDS and World Health Organization (WHO) recommend that all nations strive for “90-90-90”
  - 90% of infected persons diagnosed
  - 90% of diagnosed persons taking antiretroviral medication
  - 90% of treated patients reaching viral suppression (73% of all infected)
- All three measures are gradually increasing in most countries
- In US, 40 cities have joined a Cities Initiative to achieve this
  - Seattle probably first metropolitan area to achieve goal; Beyond AIDS Foundation recognized with award for 2017
  - San Francisco has reportedly accomplished the same

# Public health efforts that can enhance progress through HCC

- Beyond AIDS Foundation surveyed all state and territorial HIV/AIDS directors regarding four topics (funding and “expanded surveillance”):  
*J AIDS Ed and Prev 2019; 31(1):82-94, doi: 10.1521/aeap.2019.31.1.82*
  - Study showed considerable variability among jurisdictions
  - None of the these are required by law or as conditions for CDC funding
- 1. **State/regional/local and private prevention funding**
  - Supplement CDC grants, the main source of funds; many had only CDC funds
- 2. **Outreach to all newly reported diagnosed patients**
  - Assure linkage to care, partner services, urgent referrals
  - Not all jurisdiction were performing
- 3. **Monitor diagnosed patients for whom viral load reports are NOT received for an entire year**
  - Indicator for not being in care, unless moved out of jurisdiction
- 4. **Collect genotype results to monitor viral resistance, send to CDC**

# Provider efforts that can enhance HCC

- Make screening more routine in clinical care, to discover more undiagnosed cases
- Offer all diagnosed patients treatment on same day diagnosed or ASAP (NIH treatment guidelines, 12/18/19)
- Maintain diagnosed patients in treatment
  - Follow up on missed appointments
- Follow viral loads (quarterly), steadily suppress them
- Pre-exposure prophylaxis (PrEP) for persons with potential high-risk HIV exposure (unlike condoms, does not prevent other STDs)
- Counsel all at each visit to encourage risk-reduction behavior:
  - Promote condoms, ask about new partners and follow up, avoid blood exposure, screen for STDs, drug abuse treatment