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

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May 1, 2020

Planned posting of this presentation later in May 2020:
http://www.beyondaids.org/resources.html
http://www.academia.edu
http://www.researchgate.net

Characteristics, course of HIV

- RNA retrovirus: human immunodeficiency virus
  - Identified 1983, antibody test 1985, good treatments since 1996, no cure
  - Makes genetic DNA copy mixed with chromosomal material of cell, which helps to replicate virus
  - Reservoirs in lymph tissue and brain
  - Takes a chronic 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, CD4 cell count drops with corresponding decline in immunity and occurrence of opportunistic infections, cancers
- Neurological effects
  - Passes blood-brain barrier, riding inside macrophages; neurological effects include HIV-associated neurocognitive disorder (HAND)

Status of the HIV Epidemic

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

- PREVALENCE (LIVING WITH HIV)
  - US: 1.1 million (CDC estimate, 2018); about 86% aware of status
  - GLOBAL: 37.9 million (of >70 million ever infected; UNAIDS estimates, end of 2018), 23.3 million being treated (62%); 79% aware of status
- INCIDENCE/NEW DIAGNOSES PER YEAR)
  - US: 37,832 diagnoses (CDC, 2018; trend is decline but only among females and heterosexual males; 70% gay/bisexual males; more than 50% in 48 counties, DC, and San Juan)
  - GLOBAL: 1.7 million (estimated new infections, 2018; trend is decline)
- ANNUAL DEATHS
  - US: 16,000 (CDC ESTIMATE, 2017)
  - GLOBAL: 770,000 (WHO estimate, 2018; trend is decline)

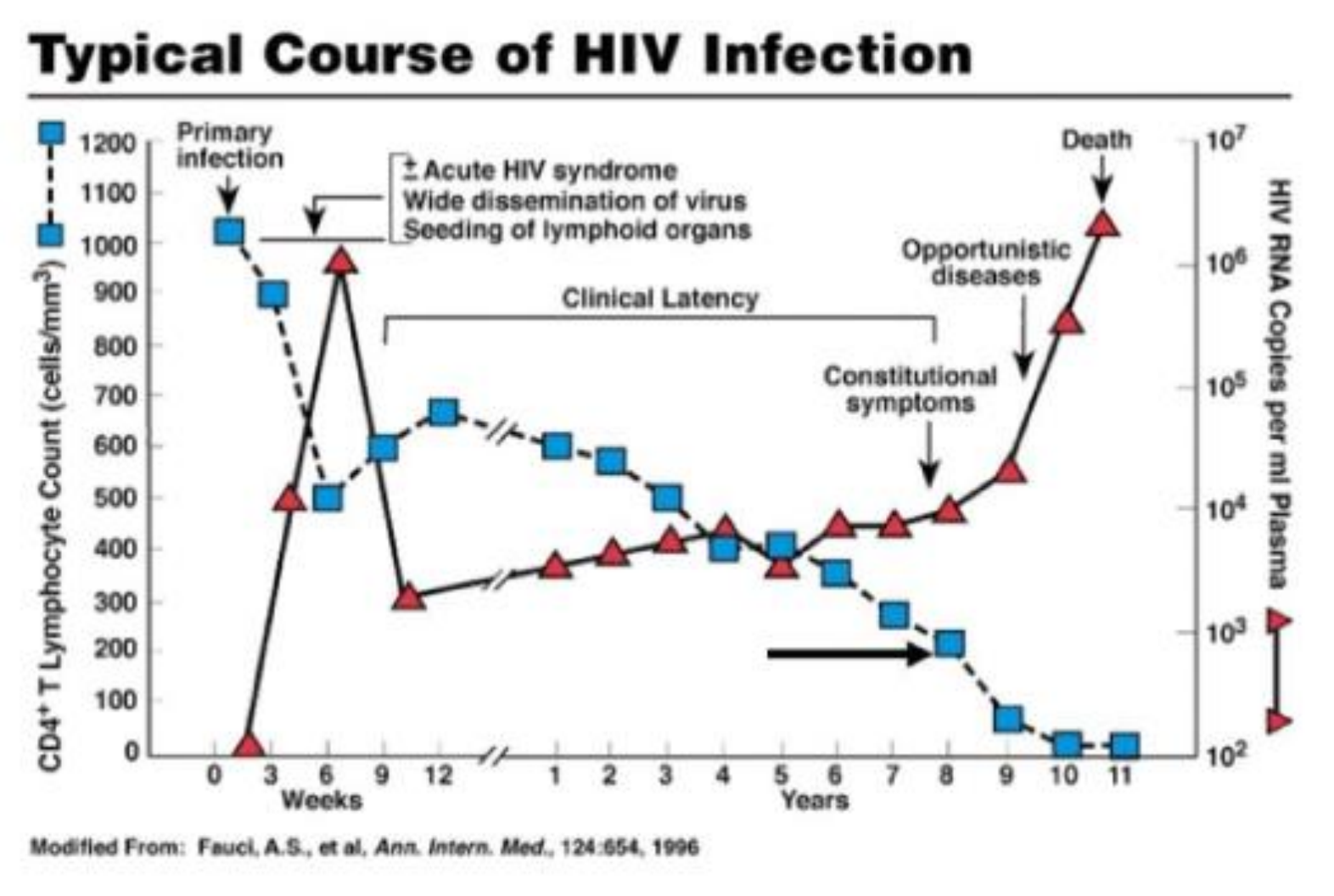
The AIDS Quilts

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.

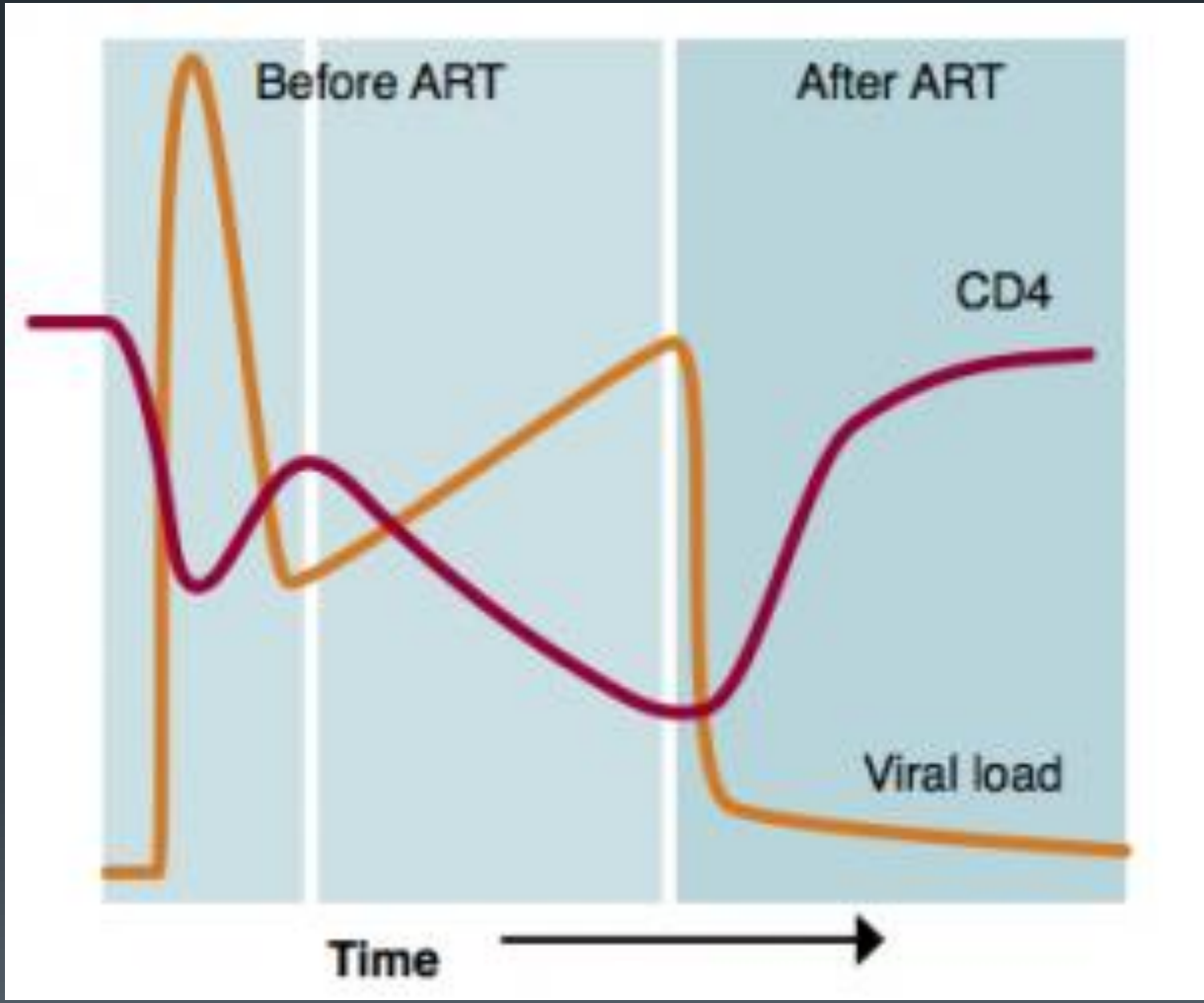
In 2004, sections of quilts were displayed at Loma Linda University for a World AIDS Day program. World AIDS Day has been observed annually globally since 1988; red ribbon is symbol.

Natural course of untreated HIV

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



Effect of treatment on course of HIV

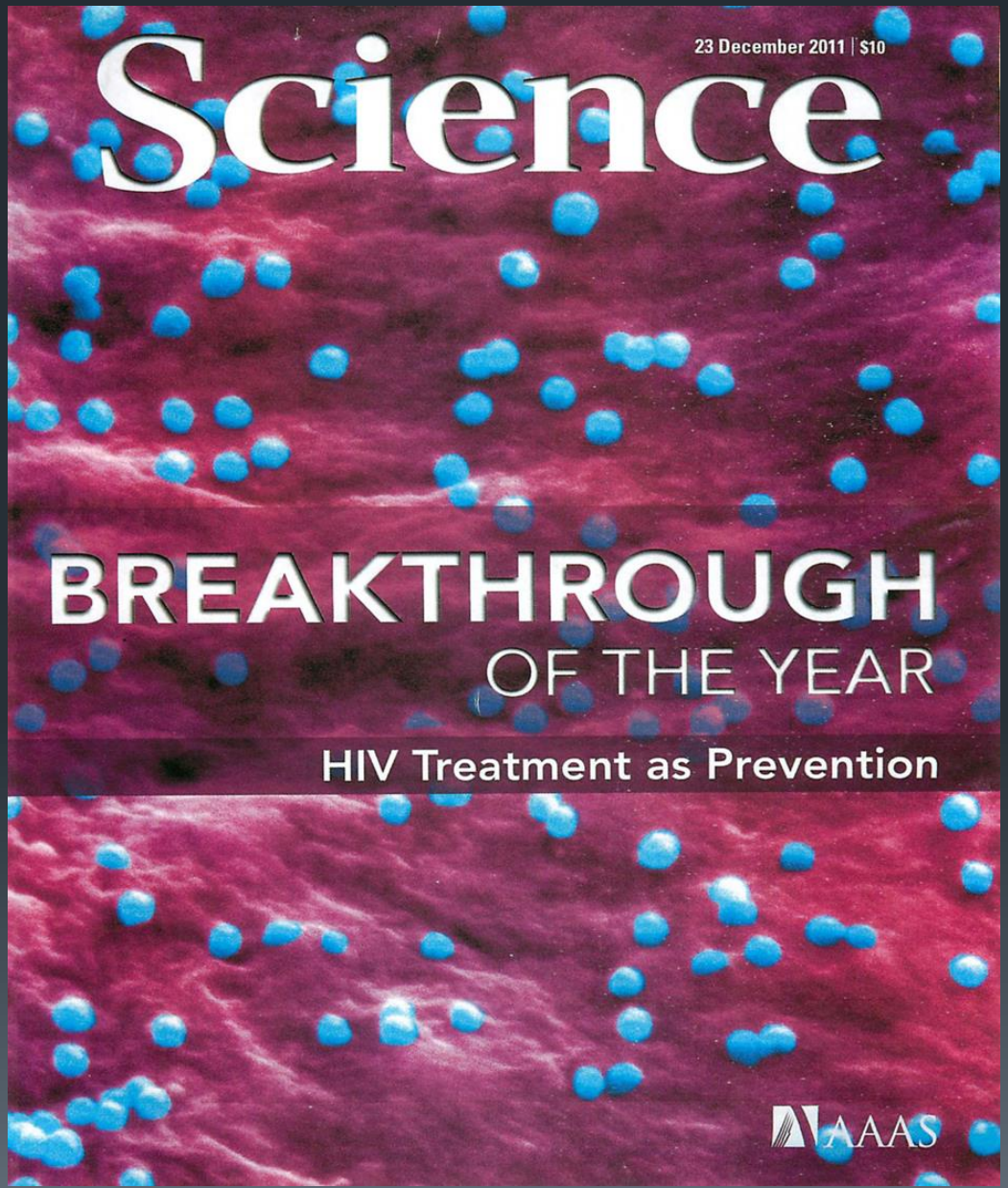


Source: iBase, 5/27/19

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), proposed at AIDS Society Conf., Paris, 7/17

Science Magazine, Dec. 2011



Antiretroviral prophylaxis: a defining moment in HIV control

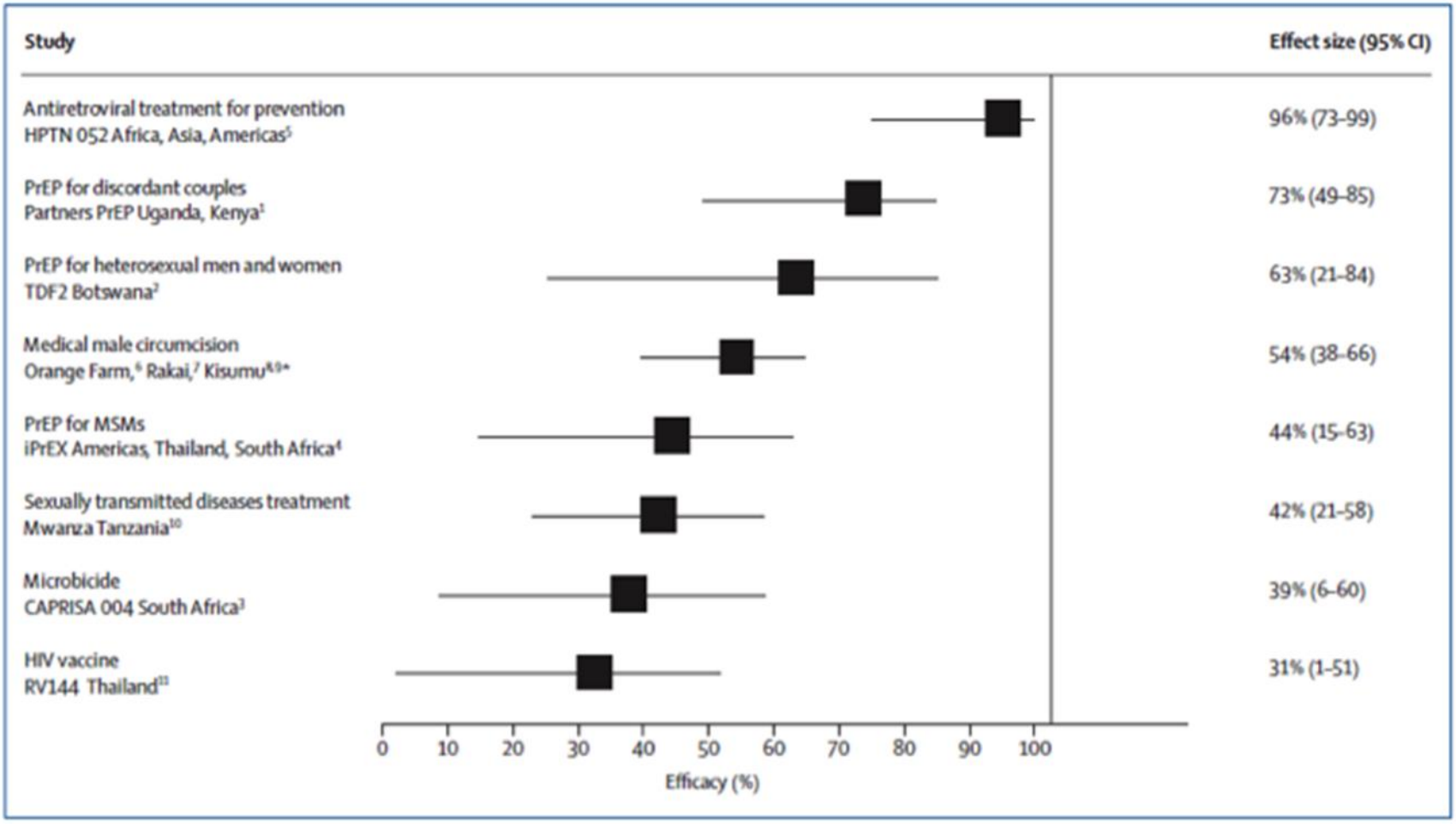


Figure: **HIV prevention technologies shown to be effective in reducing HIV incidence in randomised controlled trials[5–11]**
PrEP=Pre-exposure prophylaxis. *Meta-analysis of circumcision trials.

Published Online
July 15, 2011
DOI:10.1016/S0140-6736(11)61136-7

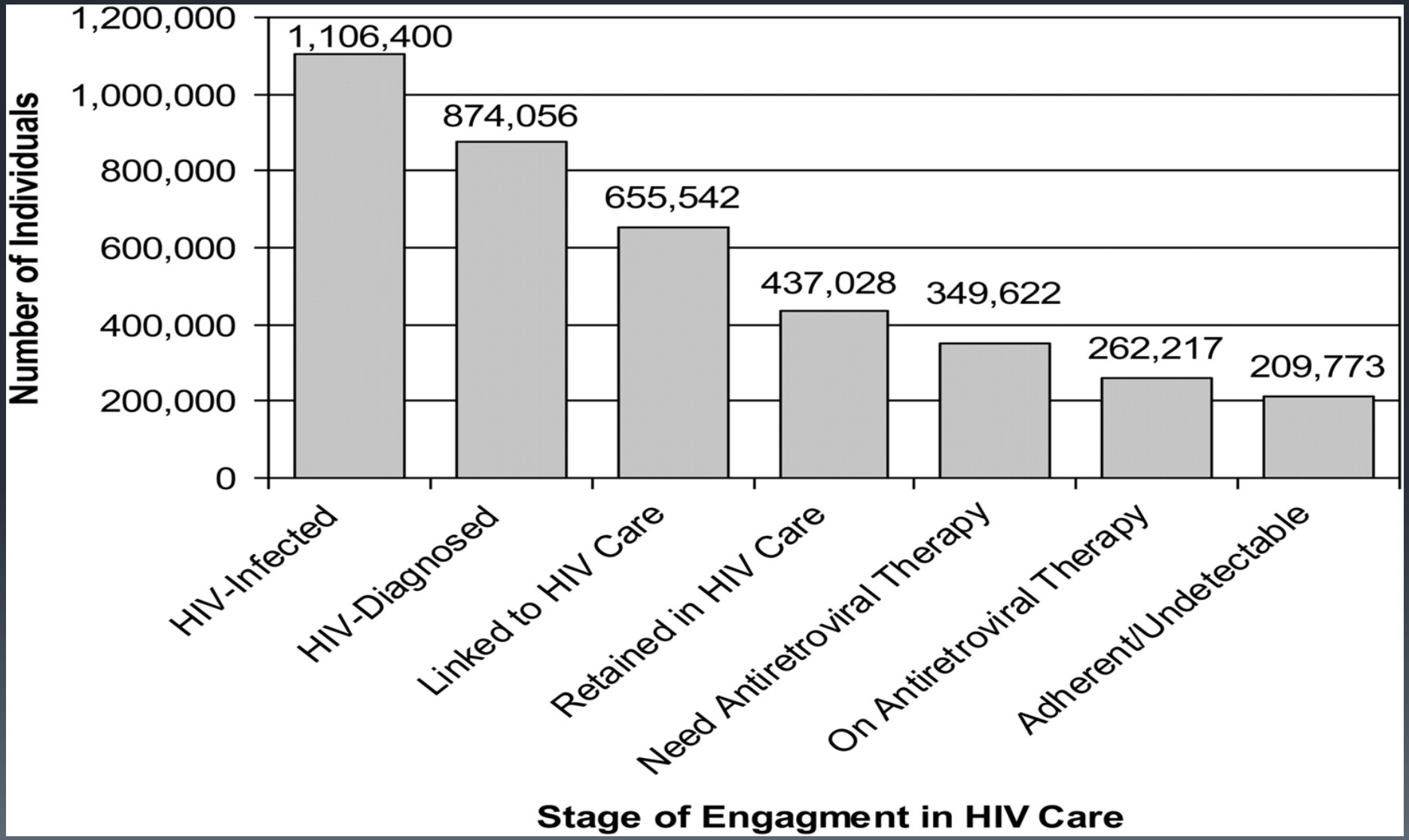
Origin of the HIV Care Continuum concept

- 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 recognizing with award for 2017
    - San Francisco has reportedly accomplished the same

Public health efforts that could enhance progress through the HCC

- Beyond AIDS Foundation has 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 shows 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
  - Some jurisdiction were not performing
- 3. Monitor diagnosed patients for whom viral load reports are NOT received, e.g., for an entire year
  - Indicator for not being in care, unless moved out of jurisdiction
  - Despite not being CDC requirement, most jurisdictions doing, many were not
- 4. Collect genotype and phenotype results to monitor viral resistance, and/or to send data to CDC to monitor patterns
  - There was not a nationwide universal surveillance system for viral resistance

Provider efforts that can enhance the HCC (included in today's program)

- 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
- Ancillary methods:
  - 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