# HIV Data in Action: Using molecular HIV data to prevent infections and improve health

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**DHSP Medical Advisory Committee**

# Evolution of HIV Prevention

- We are at an exciting time in HIV prevention:


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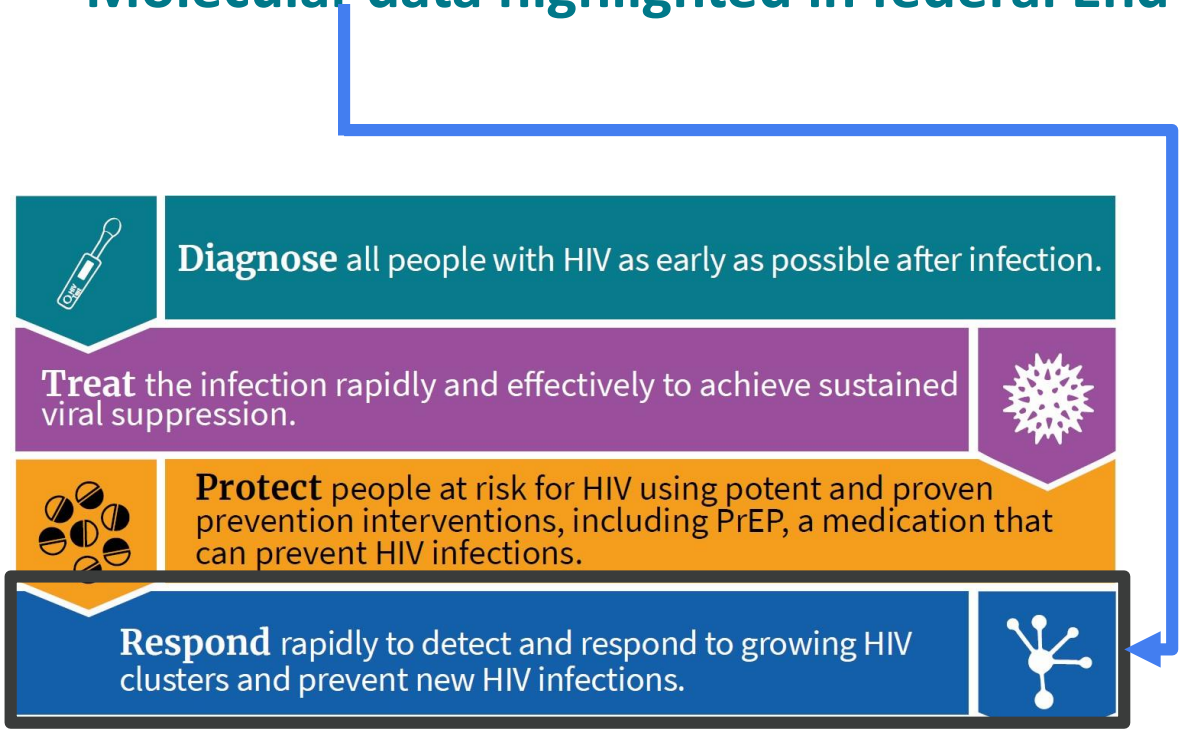
# Molecular data highlighted in federal End the HIV Epidemic plan




- In 2018, molecular epidemiology required in CDC integrated funding
- In 2019, molecular data highlighted as one of the four federal strategies

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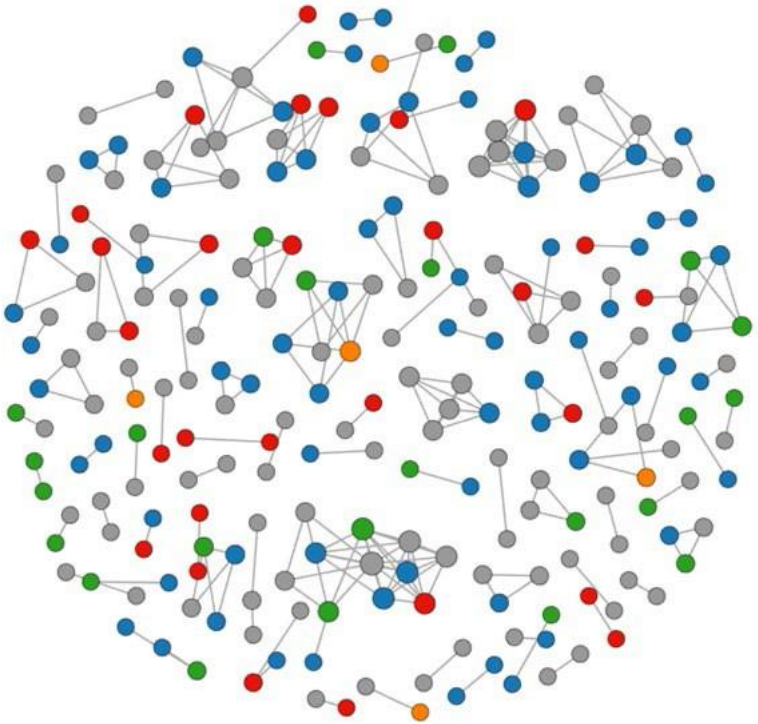
# What is HIV molecular data and how is it used?

- Drug resistance testing recommended for all HIV-infected persons
- Testing generates HIV nucleotide sequence data of the virus (*molecular HIV data*)
- Sequences can be used to identify if there are large groups of similar sequences indicating rapid HIV transmission
- We can use this information to focus prevention efforts



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# Molecular epidemiology and HIV

- HIV mutates/evolves over time
- People living with HIV infection whose viral strains are genetically similar may be more closely related in transmission


LA LA LA LA LA LA LA LA
LA LA LA **RA** LA LA LA LA

LA LA LA LA LA LA LA LA
LA LA LA **RA** LA **MA** LA LA **YA**

- Analysis: compares nucleotide sequences to determine relatedness

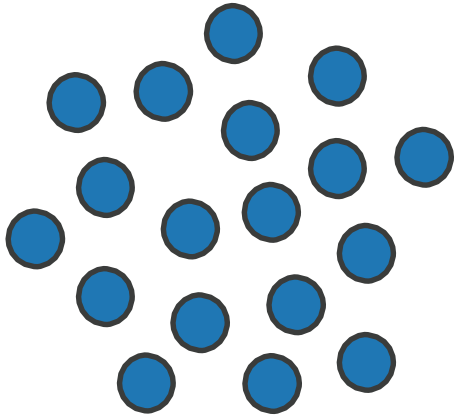
ACCGGATAACGGTTATCCG
AC**T**GGATAACGGTTATCCG

ACCGGATAACGGTTATCCG
ACCGAATCACGGAAATCCG

Adapted from presentation by J Gardy

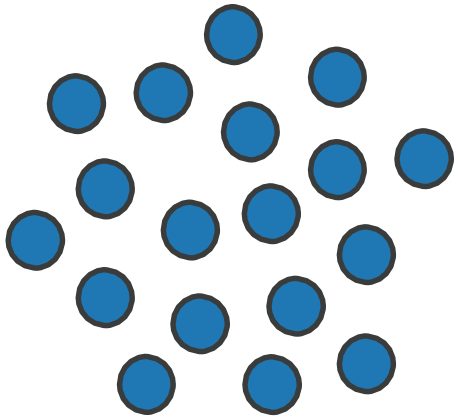
# Routine molecular analysis to detect large groups that represent recent, rapid transmission

- Secure HIV Trace program analyzes HIV pol sequences
  - Analysis focused on the most recent 3 years
  - Highly related viral sequences (≥ 99.5% similar)
  - **Priority**: At least 5 persons with HIV diagnosed within the recent 12 month period



# Molecular analysis with Secure HIV Trace does:

- NOT determine direct links between people
- NOT determine directionality of transmission
- NOT replace partner services or community outreach
- NOT indicate that an outbreak has necessarily been detected
- NOT automatically lead to new investigations



- Clusters only include some (not all) of the cases in the cluster or risk network.

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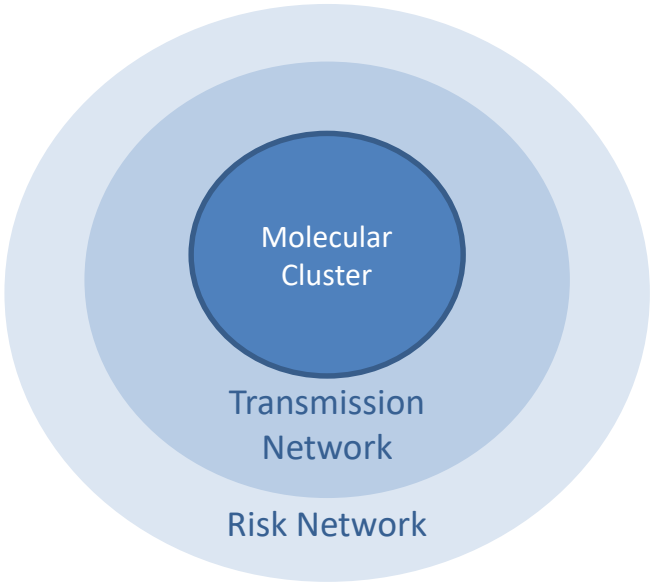
# The possibilities of using molecular cluster to identify underlying transmission cluster and risk network



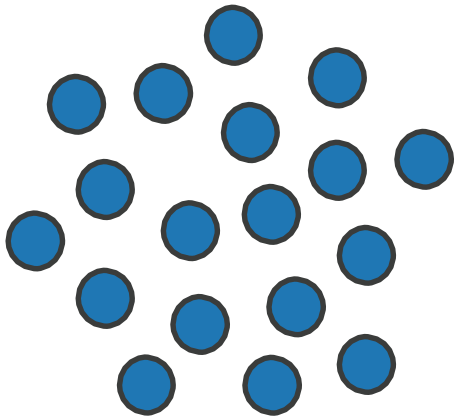

Can include persons with diagnosed HIV infection who
- Entered HIV care
- Had HIV genetic sequence transmitted to DPH

Can include
- Persons with undiagnosed HIV infection
- Persons with diagnosed HIV with no genetic sequence available

Can include
- Persons who are not HIV-infected but may be at risk for infection

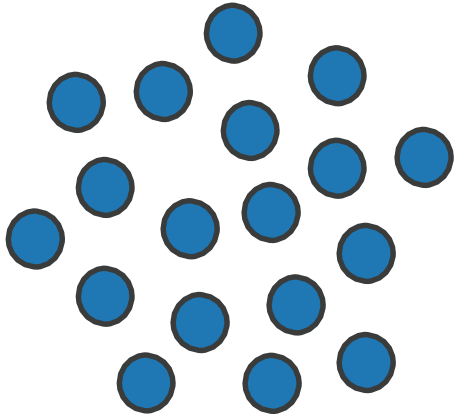
# How can it help?

- Individual Level
- Cluster cases
  - Prioritize their retention and viral suppression
  - Conduct partner services to ask for sexual partners or social contacts who could benefit from testing or PrEP
- Named contacts
  - Provide education, HIV/STD testing, linkage to PrEP
  - If HIV positive, link/re-link to care



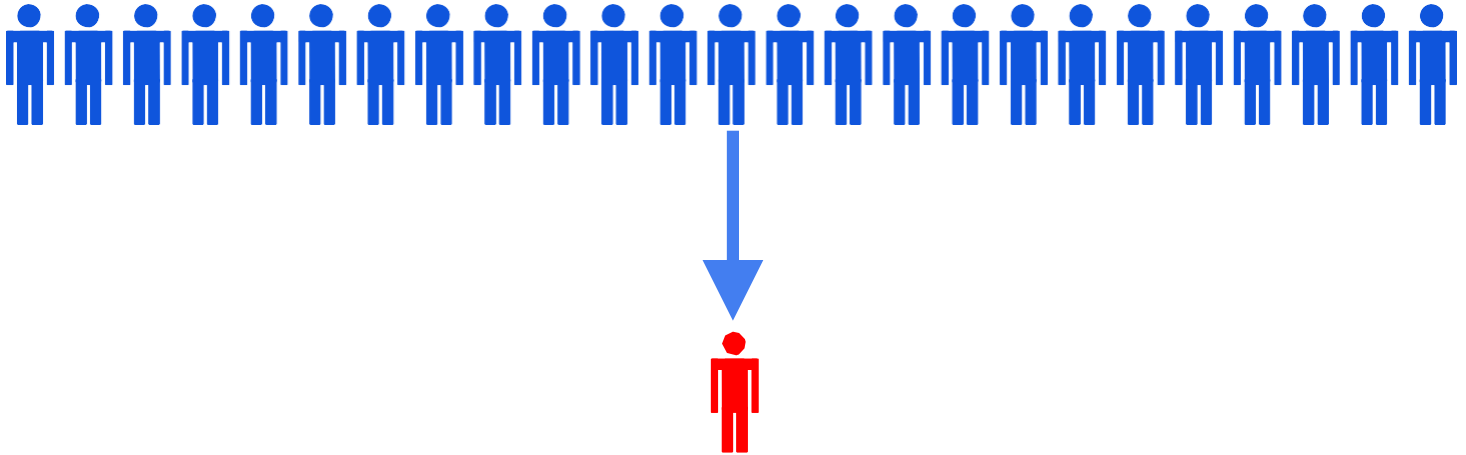
# What Public Health Can Do With Molecular Data

- Group level
  - Understand missed opportunities for HIV prevention and linkage to care
  - Identify any unusual or shared risk factors (e.g., IDU)
  - Implement approaches to overcome barriers
- Community level
  - Understand leading edge of the local epidemic



# HIV transmission in the United States

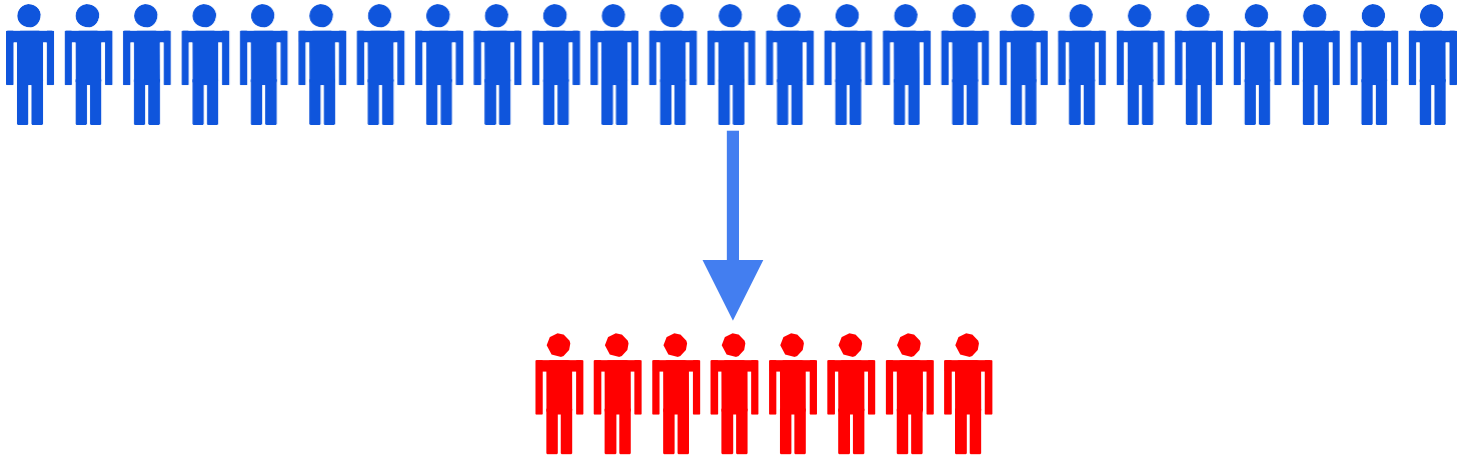
## ~ 4 HIV transmissions per 100 people with HIV each year



Ref: Oster et al. JAIDS 2018

# HIV transmission among people in a priority cluster

**~ 33 HIV transmissions per 100 people with HIV each year**



Ref: Oster et al. JAIDS 2018

# Example 1: San Antonio, Texas

Molecular cluster members:

**n=24**

Other people who were sexual or needle sharing partners of initial 24 persons or their partners:

**n=87**

# Example 1 (continued): An opportunity to identify and address gaps in prevention

- Health alert to providers educated on HIV diagnostic testing and acute infection
- Health alert educated on PrEP, funds redirected to scale up access to PrEP in specific regions of the city
- New coalition of community, providers, and public health → sign-on as a Fast Track City
  - Efforts to reduce stigma, improve care, eliminate new cases of HIV

# Example 2: Massachusetts

- Increase in HIV diagnoses among persons who inject drugs (PWID) in northeastern Massachusetts, most notably in the cities of Lowell and Lawrence.
- 93 people initially identified by epidemiologic investigations
- 36 additional people linked to the outbreak with molecular data
- Similar demographics, but less likely to accept partner services and more likely to live outside of the immediate geographic area
- Seven distinct molecular clusters identified – multiple HIV transmissions into the risk network
- Established new syringe exchange and expanded field investigations

Ref: John et al. CROI 2019

# LAC DPH Experience to Date

- Run HIV Trace every 2 weeks
- Any new cases associated with the existing cluster or new cluster
  - Currently one large cluster of 26 people
  - Identify whether they appear to be in care and virally suppressed
    - If not, refer to our Linkage Re-engagement Program
    - If yes, check to see if they received HIV Partner Services after diagnosis
      - If no, then refer to our Partner Services staff to interview
        - » If any partners or contacts identified, follow-up to educate, link to testing, PrEP
        - » "Who would benefit from an HIV test in your circle of friends?"

*Preliminary information.

## Questions and Concerns Raised

- How to message to clients?
  - What if they already received PS or are in care?
  - What if significant time has lapsed since diagnosis?
- What other ways can this information be used?
  - Any role for their HIV medical provider?
  - Explain DPH role and plan to contact?
  - Coordinate interview?
- How can these services be conducted in a culturally sensitive and non-coercive manner?
  - Importance of community engagement

# Evolving Terminology

| Term in use | Preferred term |
|---|---|
| Surveillance data | Public health data |
| Molecular cluster or genetic cluster | Group of related infections |
| Molecular analysis | Laboratory analysis |
| Time-space cluster | Increase in diagnoses |
| Investigation | Effort to understand why transmission is occurring |

## Next Steps

- Community and partner engagement
  - Best practices to communicate with community and general public?
  - Ability to expand access to linkage to care and partner services?
  - How to communicate and problem-solve with medical providers and case managers when clients in a cluster are not virally suppressed?

# Los Angeles County HIV Strategy Goals

- Reduce annual HIV incidence to 500 by 2022
- Increase the proportion of Persons Living with HIV (PLWH) who are diagnosed to at least 90% by 2022
- Increase the proportion of diagnosed PLWH who are virally suppressed to 90% by 2022

# Acknowledgments


- Phil Peters, Marisa Ramos and team at Office of AIDS
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