

# HIV-1 Antiretroviral (ARV) Drug Resistance and Health Outcomes in Florida, 2015–2017

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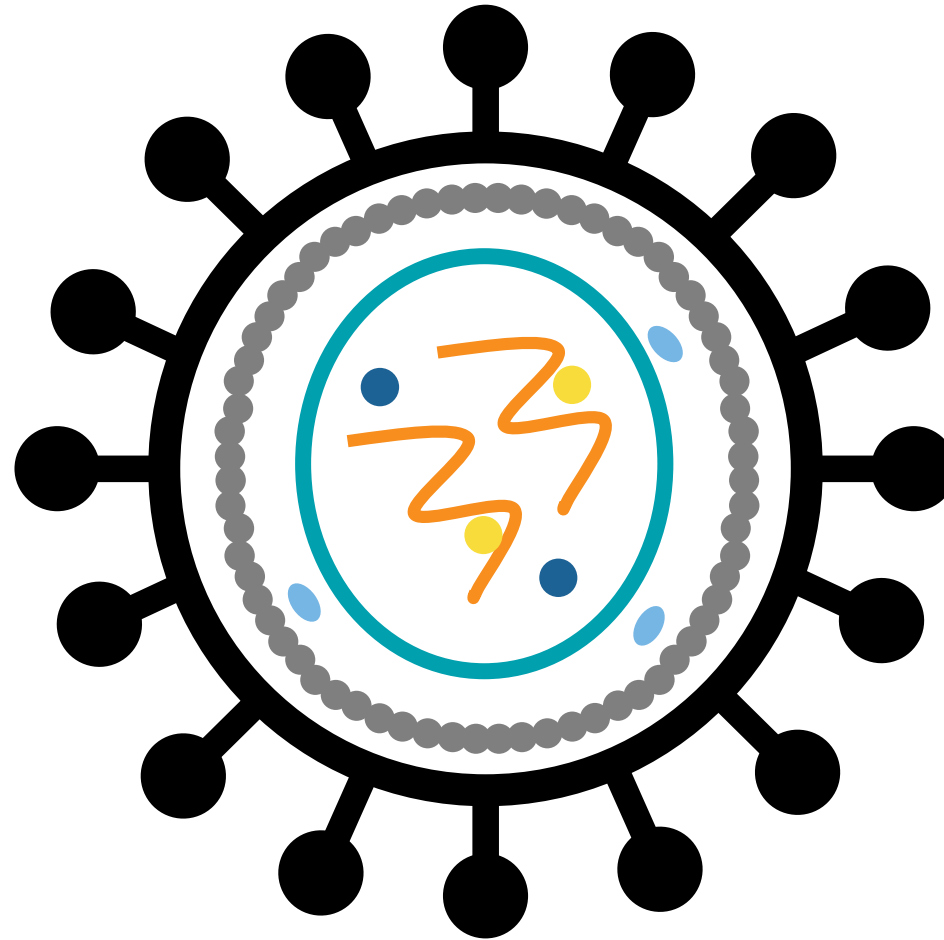
# Objectives

To understand the current state of HIV ARV drug resistance across Florida so treatment regimens can be adjusted and optimized prior to, and following treatment failures, and reduce the incidence and transmission HIV in Florida's population.

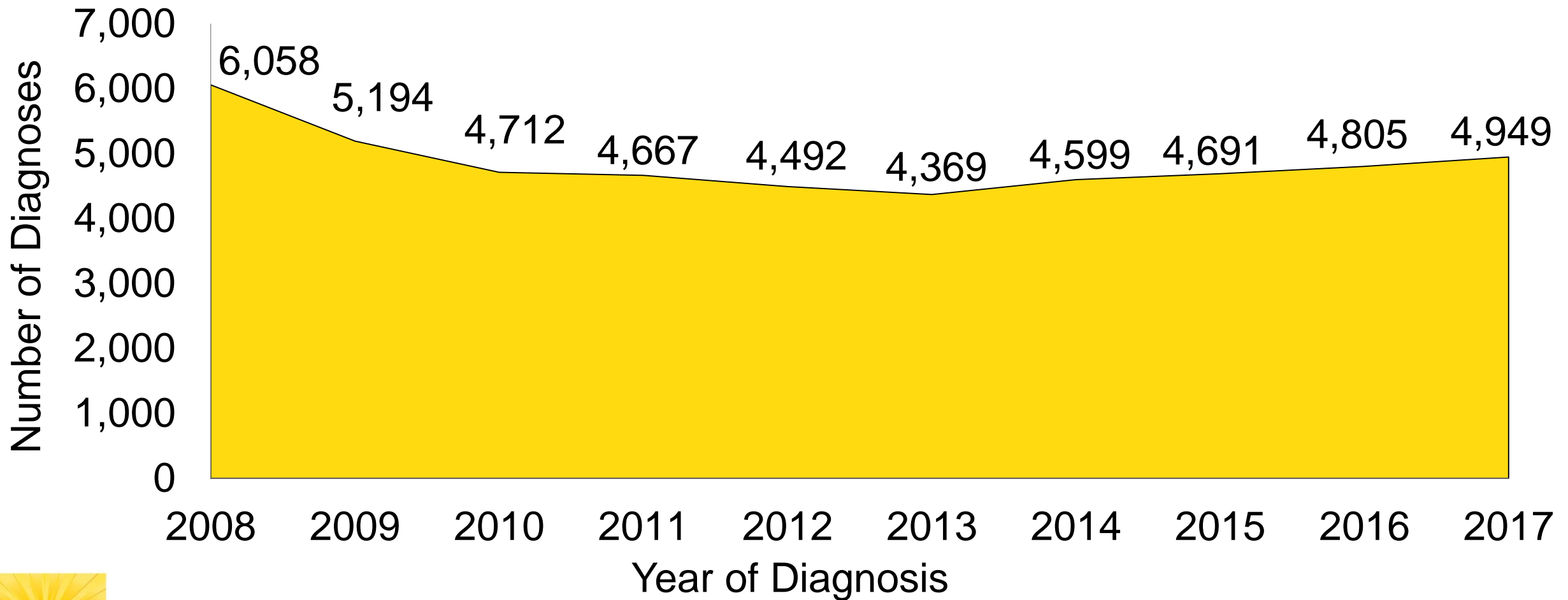
## **Objectives of the study include;**

- Recognize geographic and temporal patterns and emergence of HIV ARV drug resistance across the state
- Understand the burden of transmitted resistance (newly infected acute cases) versus acquired resistance (those on long term ARVs without prior resistance)
- Measure whether current ARV practices and genotypic testing timeframes are successful across the state by assessing viral load suppression following ARV initiation and monitoring for virologic failure

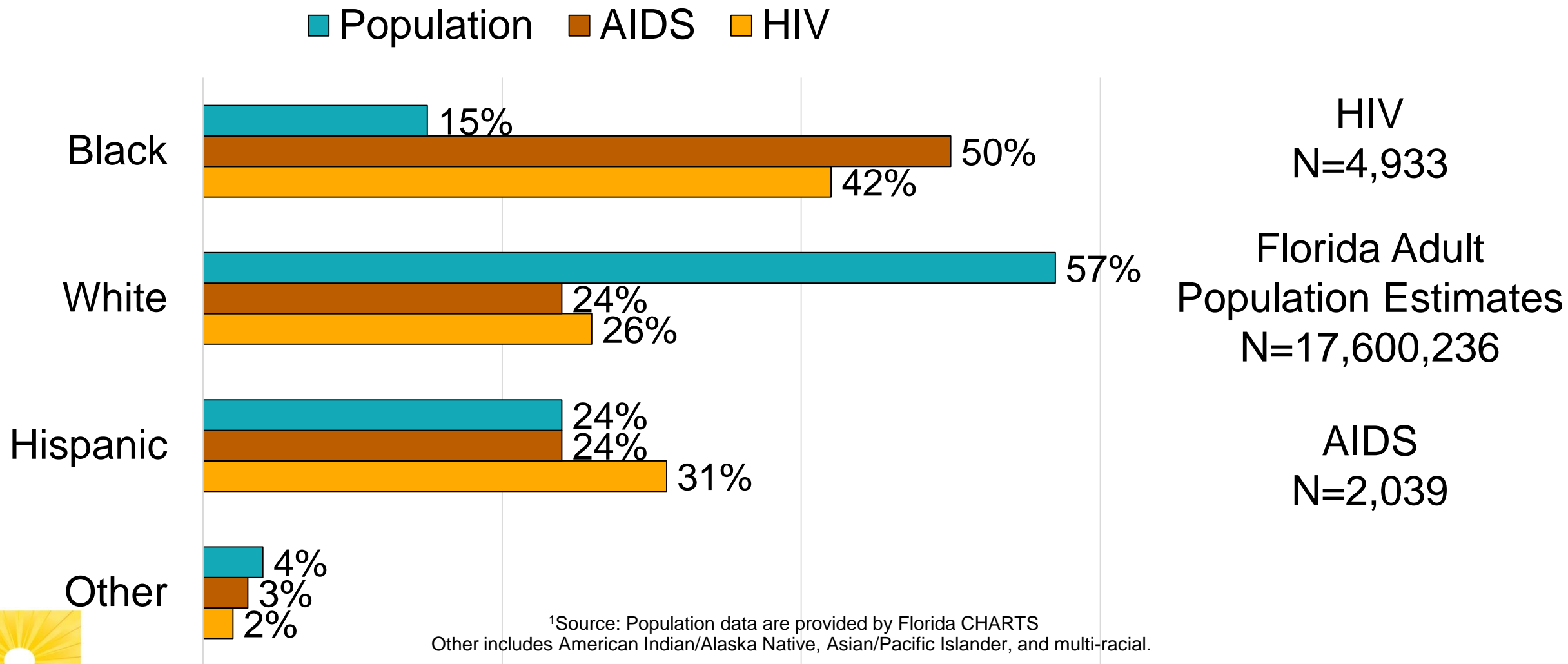
# HIV In Florida



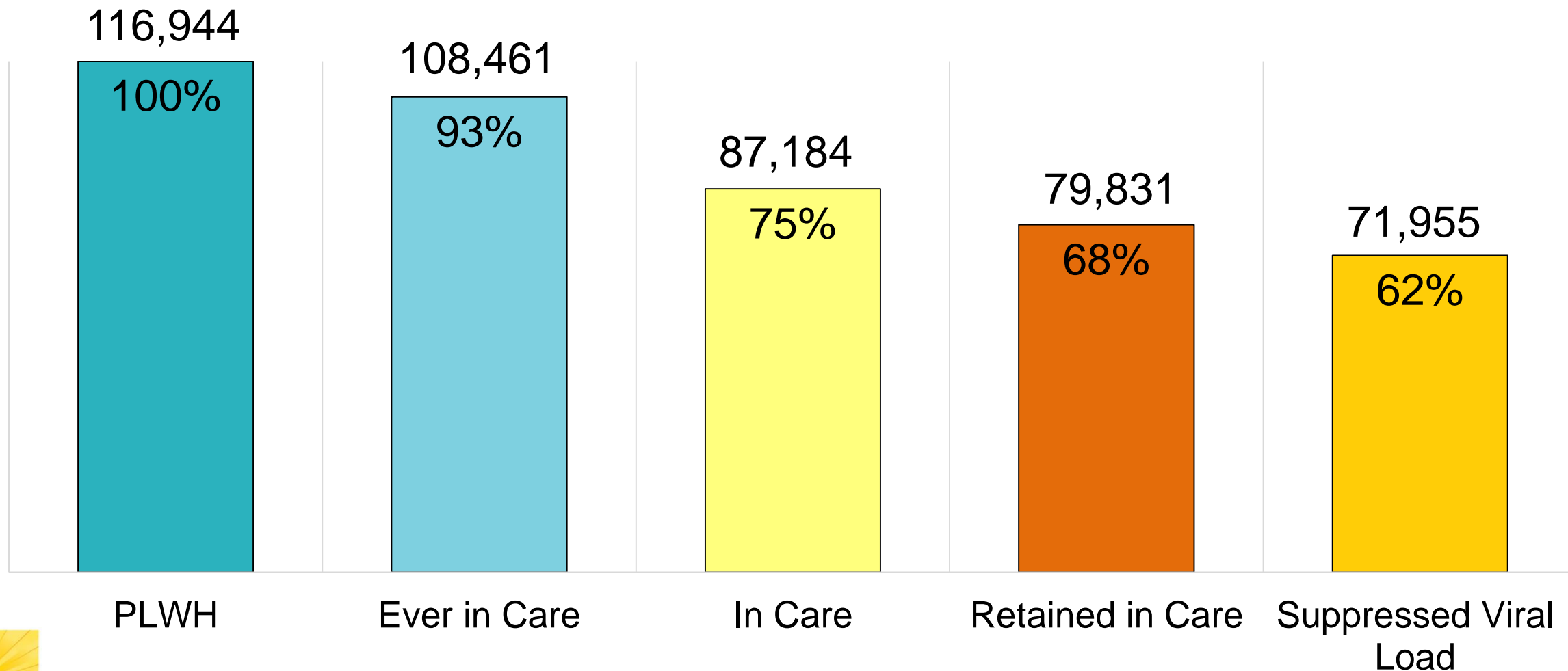
# HIV Diagnoses by Year of Diagnosis, 2008–2017, Florida



# Percentage of Adult (Age 13+) HIV and AIDS Diagnoses and Population<sup>1</sup>, by Race/Ethnicity, 2017, Florida



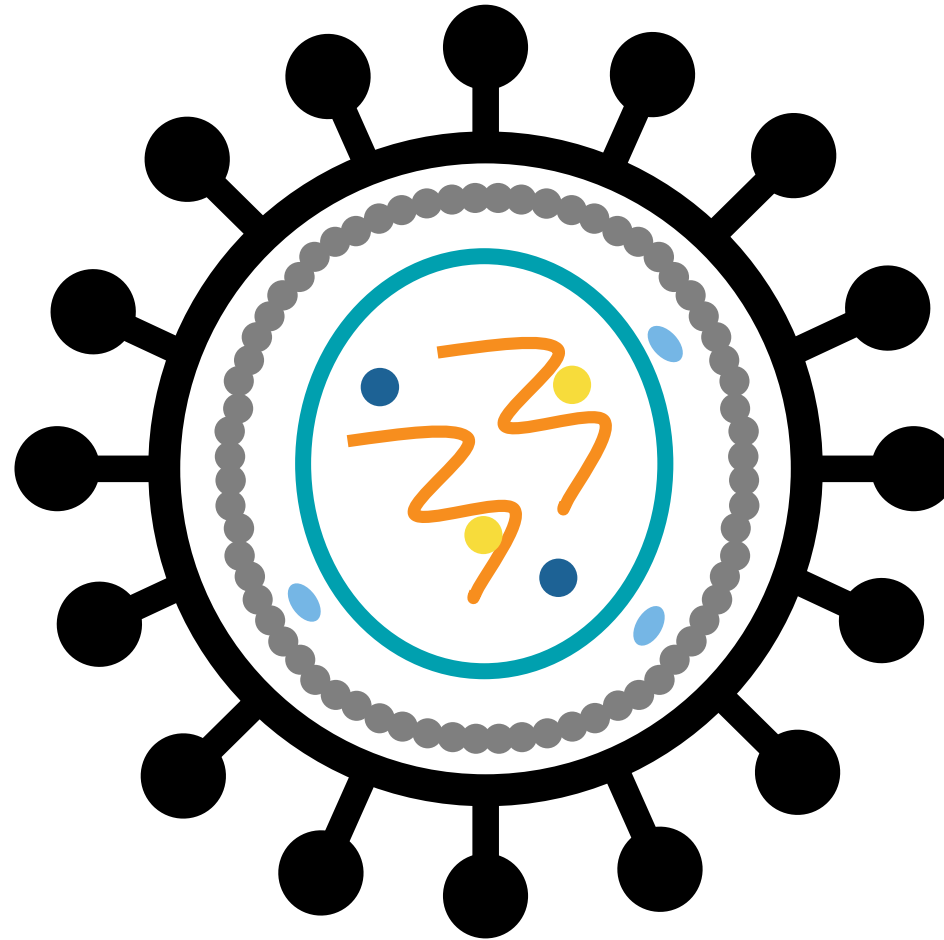
# Persons Living with HIV (PLWH) in Florida along the HIV Care Continuum in 2017



# Florida's Plan to Eliminate HIV Transmission and Reduce HIV-related Deaths

- 🦋 Implement routine HIV and Sexually Transmitted Infections (STIs) screening in health care settings and priority testing in non-health care settings
- 🦋 Provide rapid access to treatment and ensure retention in care (Test and Treat)
- 🦋 Improve and promote access to antiretroviral pre-exposure prophylaxis (PrEP) and non-occupational post-exposure prophylaxis (nPEP)
- 🦋 Increase HIV awareness and community response through outreach, engagement, and messaging

# HIV-1 Antiretroviral Therapies





# HIV Antiretroviral Therapy Timeline

AIDS Epidemic officially begins, with cases in New York, California and Florida

1981

HIV develops resistance to AZT

1987

AZT a nucleoside reverse transcriptase inhibitor (NRTI) approved by FDA  
Congress approved \$30 million in emergency drug assistance funding

1989

Highly Active Antiretroviral Treatment (HAART) triple combination therapy shown to be effective

1995

First Protease Inhibitor approved

1996

Protease Inhibitor drug resistance becomes a concern

1997

ARV resistance testing becomes a standard part of HIV care

2000

First Integrase Inhibitor approved by FDA

2007





# HIV-1 Antiretroviral Resistance

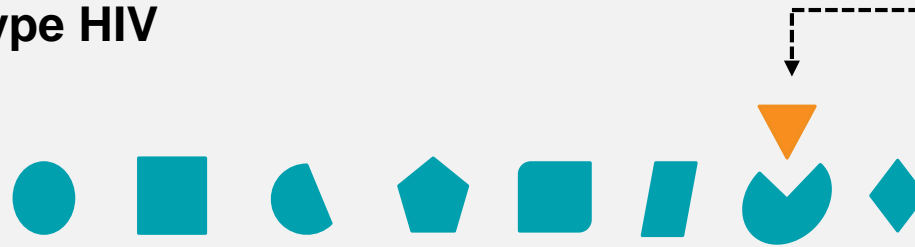
## Key

● ■ ▲ ◆ HIV Genetic Sequence

▼ Antiretroviral drug

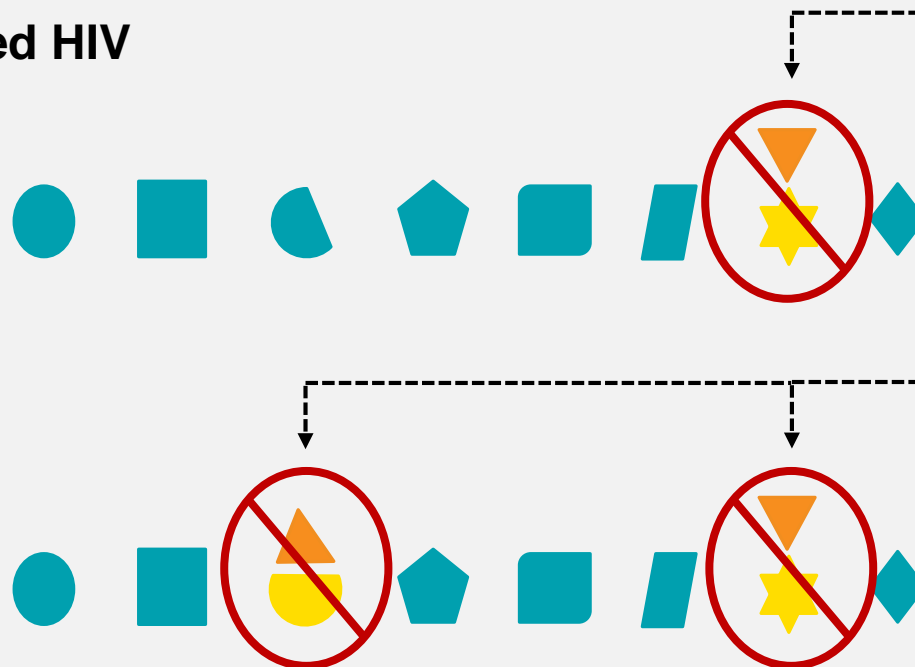
◐ ★ Gene Mutation

### Wild type HIV



Antiretroviral drug blocks virus replication and leads to viral suppression

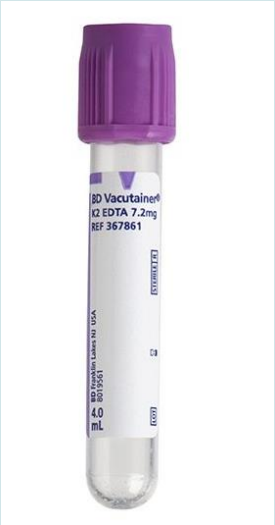
### Mutated HIV



Drug resistance occurs following mutation and viral replication continues

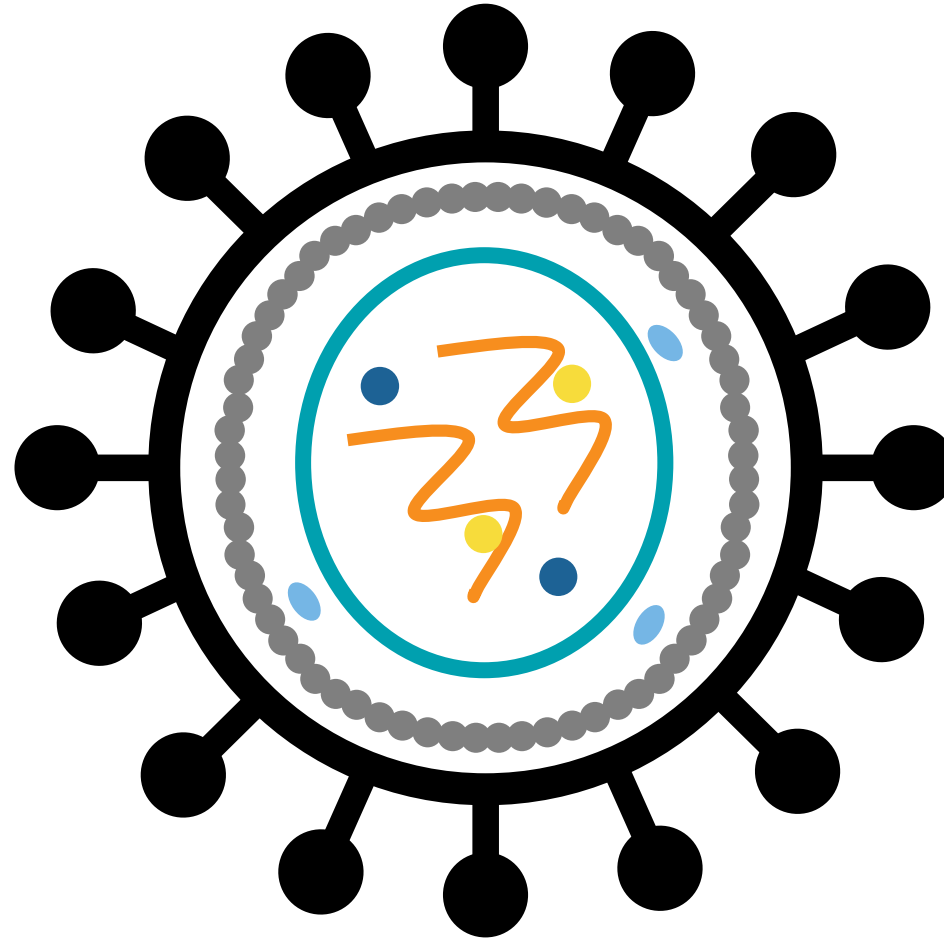
Viral replication can lead to more mutations which can lead to multiple drug resistance

# ARV Treatment Guidelines

Test	Drug Resistance Testing (Genotype, Phenotype)
<b>Rationale</b>	<ul style="list-style-type: none"> <li>To assess whether the patient's HIV virus is likely to be resistant to specific ARV medications</li> </ul>
<b>Result</b>	<ul style="list-style-type: none"> <li><b>Genotype: detects specific mutations to ARV medications</b></li> </ul>
<b>Frequency and Comments</b>  	<ul style="list-style-type: none"> <li>Genotype is recommended for all ARV-naïve patients, as early as possible in the course of HIV infection</li> <li>Acute or primary infection</li> <li>Chronic infection and treatment naïve: recommended before initiation of ART</li> <li>Pregnancy: recommended before initiation of ART (repeat if done earlier) or for patients with detectable HIV viral load while taking ART</li> <li>In case of virologic failure</li> <li>Obtain genotype for integrase mutations if integrase inhibitor resistance is a concern</li> </ul>

Health Resource and Service Administration (HRSA), 2014

# HIV-1 Resistance Data Collection and Analysis

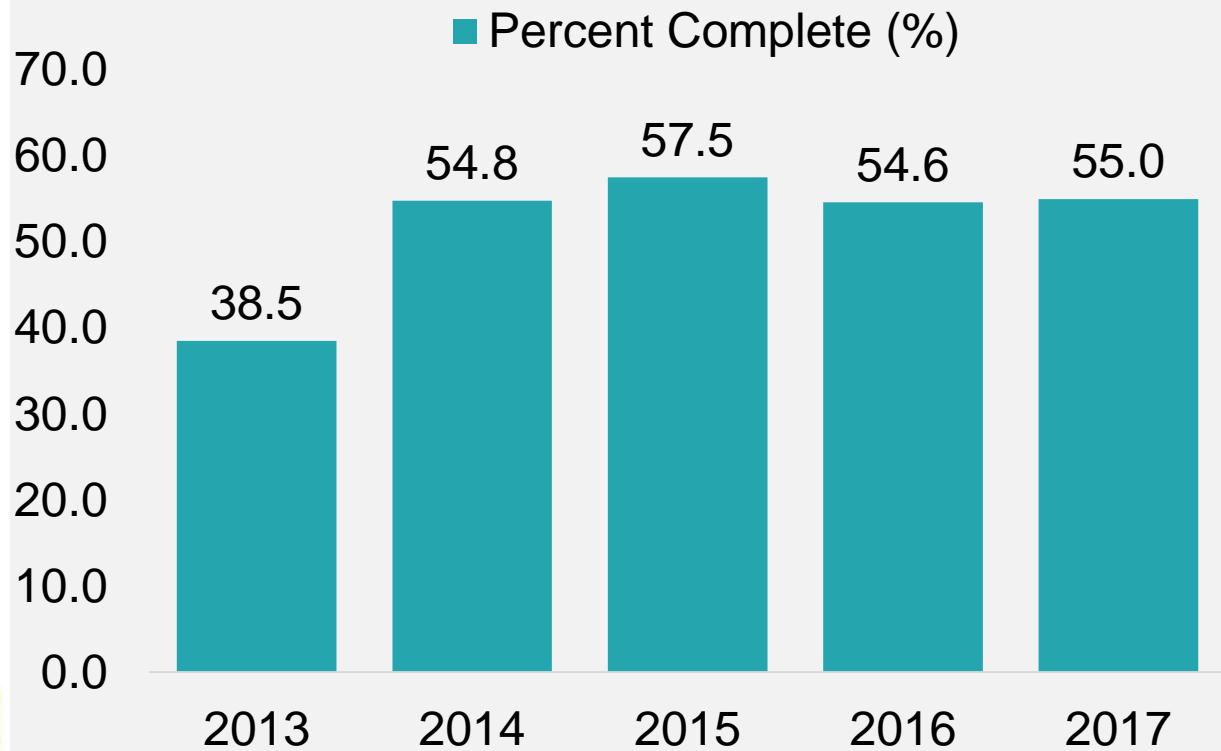


# HIV Surveillance Reporting Authority

- **Chapter 384.25, Florida Statutes (F.S.)** (Sexually Transmissible Diseases)
- **Chapter 381.0032, F.S.** (Public Health: General Provisions)
- **64D–3.030 Reporting Requirements for Physicians**
- **64D–3.031 Reporting Requirements for Laboratories**

# At least ( $\geq$ ) 60% of newly diagnosed persons should have an initial HIV nucleotide sequence within 3 calendar months following HIV diagnosis

**Nucleotide Sequence Test Completeness for New Diagnoses, 2013–2017, Florida**



PLWH may not have sequence data available because:

- They did not enter HIV care
- They entered HIV care but had no drug resistance testing
- They entered care and had drug resistance testing but no sequences were provided for surveillance

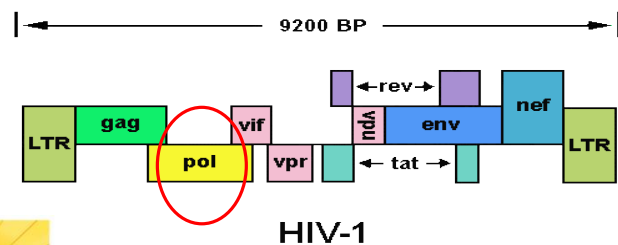
# Analyzing HIV ARV Resistance

HIV-1 nucleotide genotype sequences in the *pol* region reported to the Florida Department of Health HIV/AIDS Surveillance System were analyzed for persons whose HIV was diagnosed in Florida with a sequence obtained within 3 months of diagnosis in 2015 (n=2,194), 2016 (n=2,063), and 2017 (n=2,080).

Persons who reported taking ARV drugs before the date of the genotype or with a suppressed viral load within 14 days of the date of the genotype were excluded from the analysis.

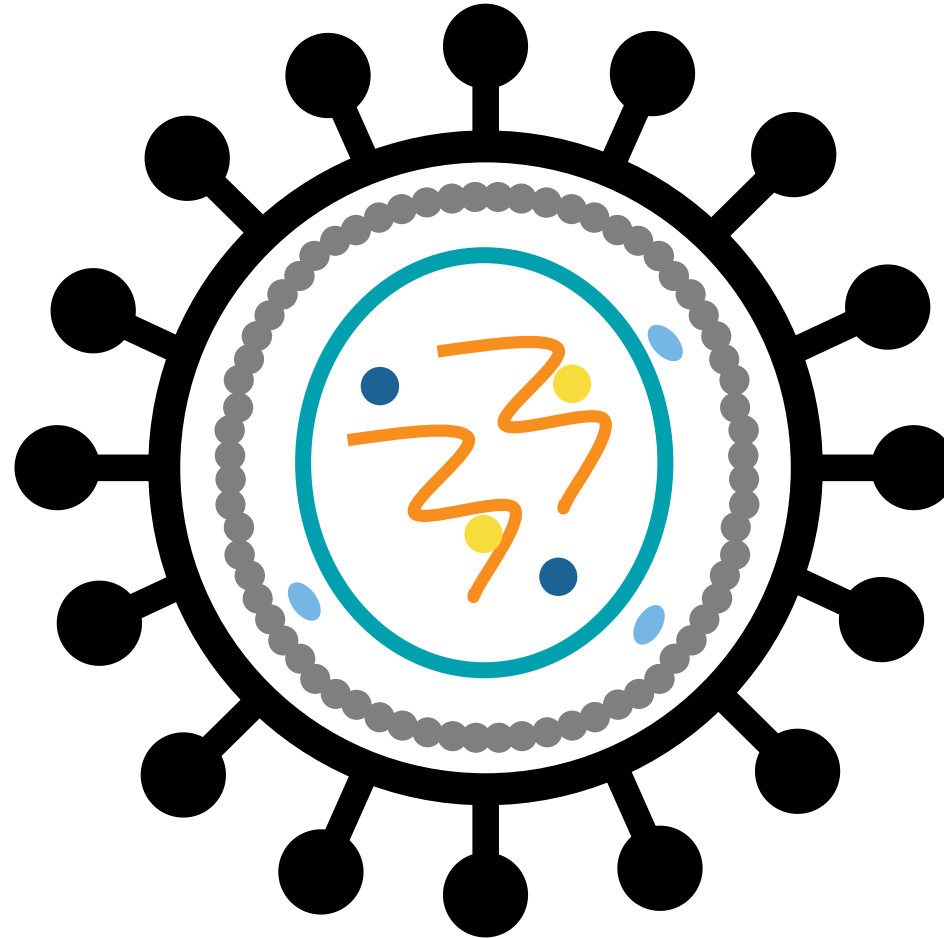
ARV drug resistance was determined using the Stanford HIV Drug Resistance Database

<https://hivdb.stanford.edu>

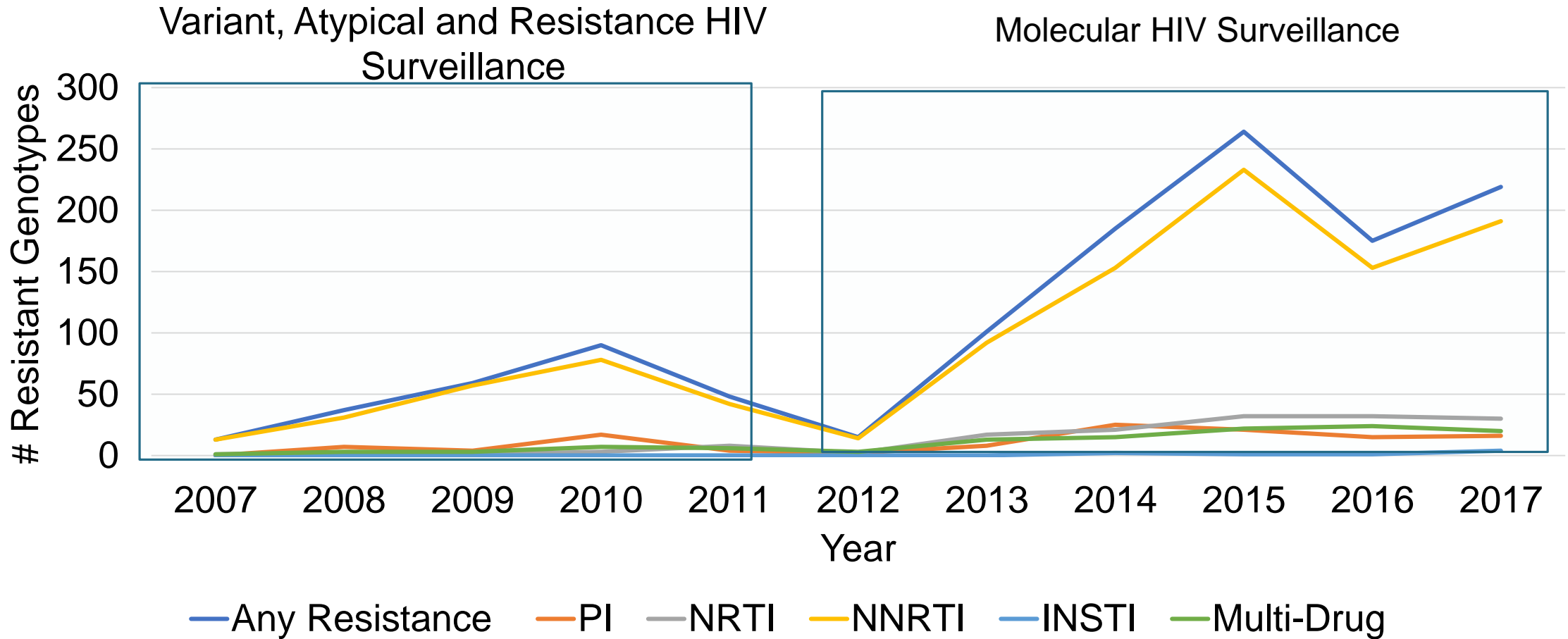




# High Level HIV ARV Resistance in Florida



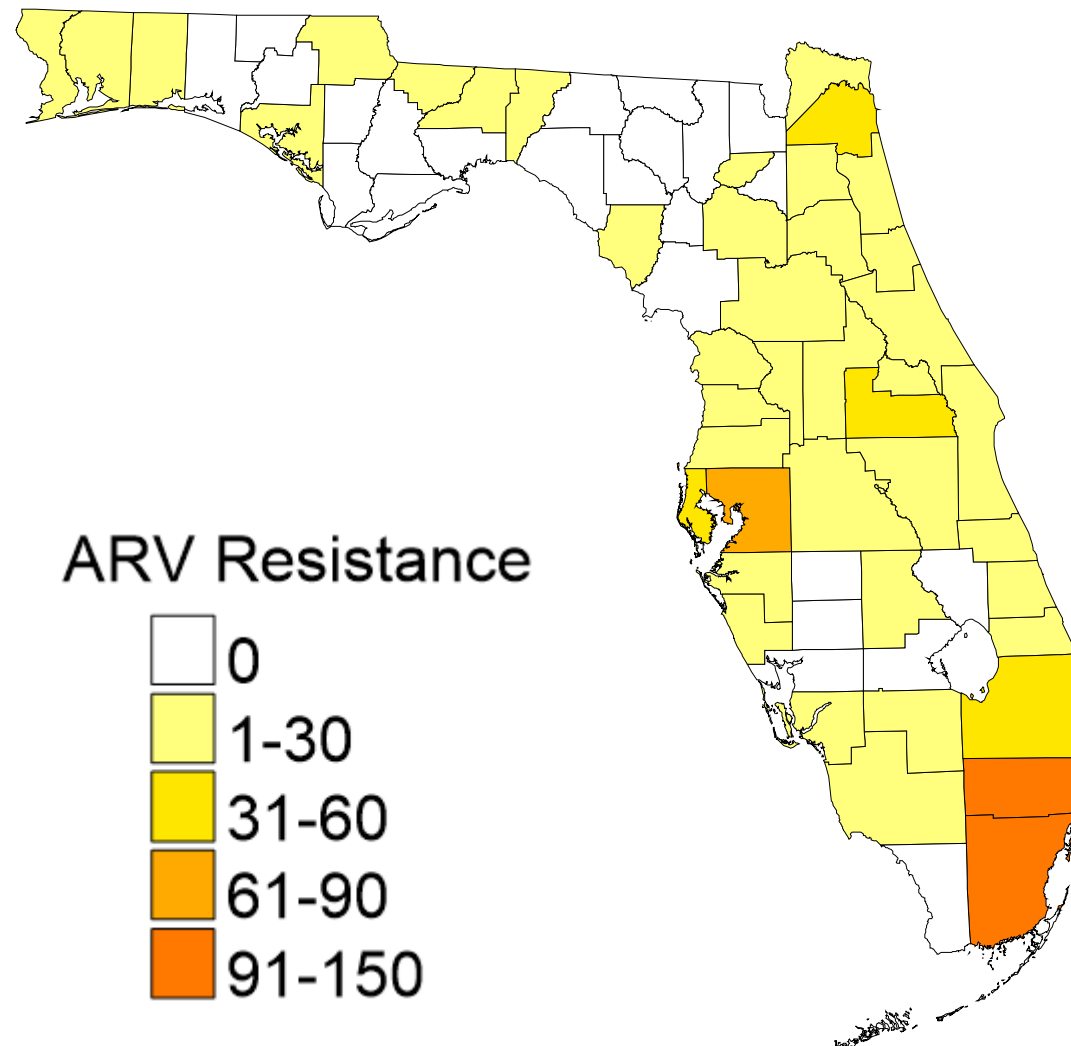
# Prevalence of High Level HIV-1 Resistance in Florida (2007–2017)



Data as of 6.30.18

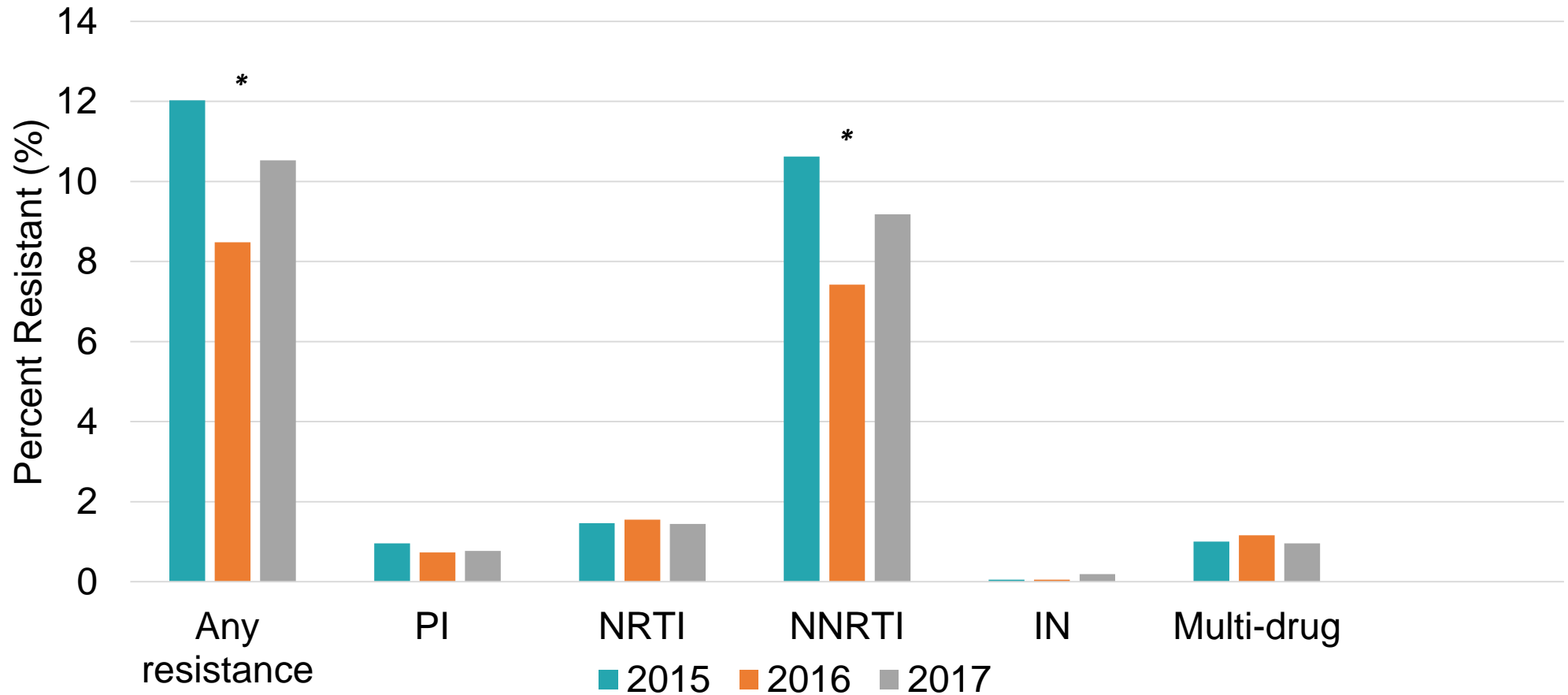


# HIV Resistance in Florida Among Persons with HIV Diagnosed in 2015–2017



Data as of 6.30.18

# Prevalence of High Level HIV-1 Resistance in Florida (2015–2017)

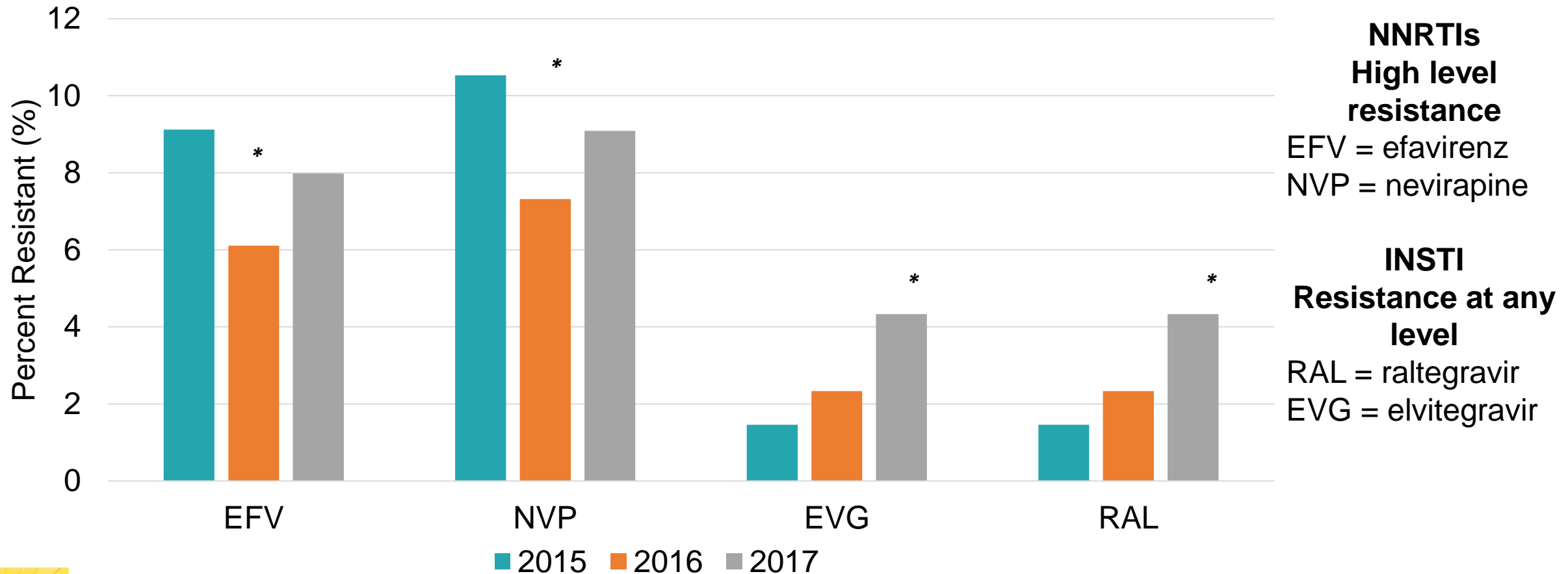


Data as of 6.30.18

*\*significant at <math><.0001</math>*



# Changes in Annual Drug-Specific Resistance (2015–2017)

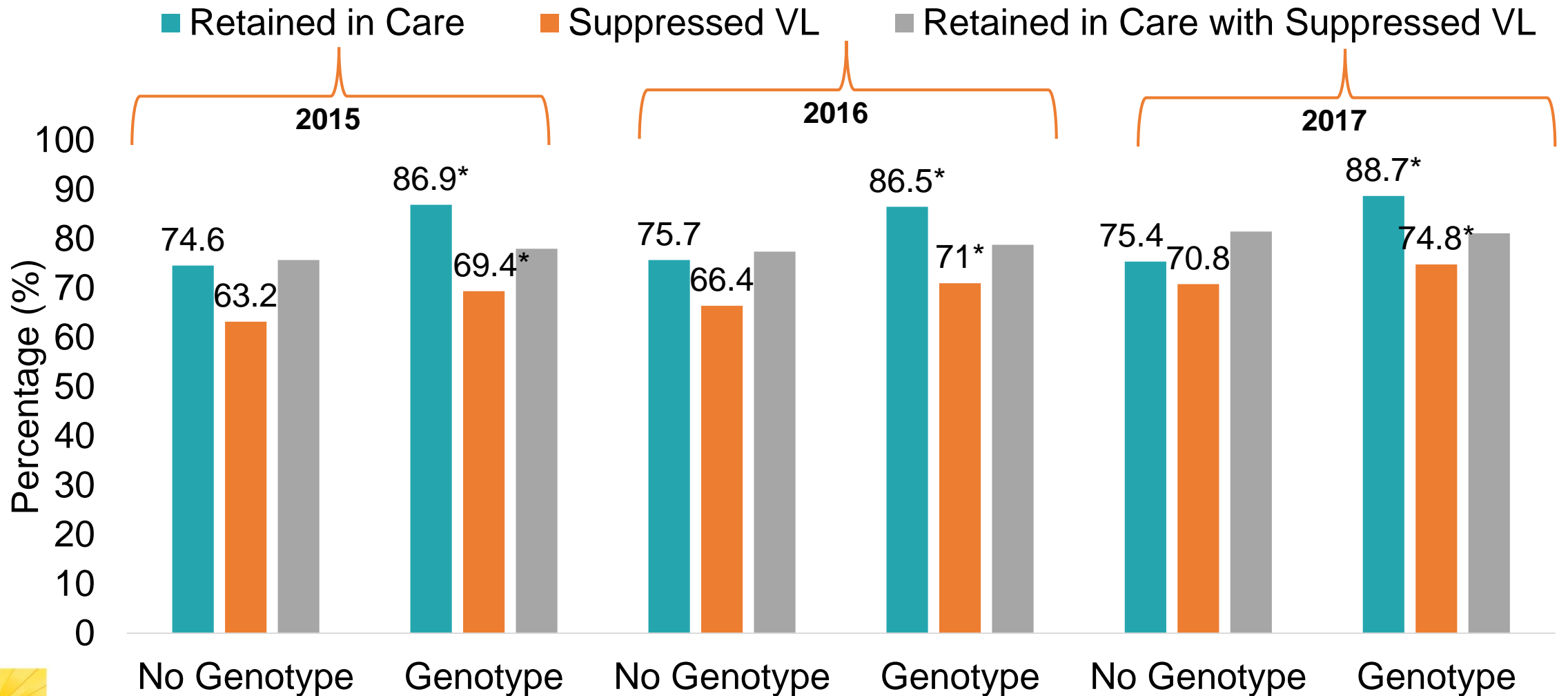


Data as of 6.30.18

\*significant at <.0001



# Continuum of HIV Care by HIV Genotype Status in Florida (2015–2017)



\*significant at <.0001



# Summary

- HIV-1 resistance is dynamic in nature changing from year to year
- NNRTIs remain the drug class with the highest prevalence in Florida
- Resistance to INSTI is slowly increasing
- Persons without a genotype are less likely to be virally suppressed and retained in care

# ARV Resistance Testing and Reporting

## Barriers

- Missing Labs through Electronic Laboratory Reporting
- Labs that report through paper reporting do not provide a full sequence
- Provider compliance to order initial genotype at diagnosis not at 100%
- Medication adherence issues

## Recommendations

- Priority testing in areas with high incidence and prevalence of TDR
- Single stage HIV testing for new positives
- Provider and patient education
- Adherence to HRSA performance measures for initial genotyping of newly diagnosed



# For more information

- <http://www.floridahealth.gov/diseases-and-conditions/aids/surveillance/index.html>

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