

# **Distribution of HPV Types among a Population-Based Sample of Invasive Cervical Cancers across 7 U.S. States**

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# Factors Associated with Invasive Cervical Cancer (ICC)

- Infection with carcinogenic HPV is a necessary factor in developing cervical cancer.
- Other factors:
  - About half the cases are under age 50
  - Black and Hispanic women have higher rates
  - # Sexual partners
  - Smoking
  - Lack of screening
- About 72% squamous cell carcinoma, 19% adenocarcinoma

# ICC Age-Adjusted Incidence Rates, by State (2003-2007)\*

- Louisiana 9.3
- Kentucky 9.2
- Florida 9.2
- California 8.2
- Hawaii 7.6
- Michigan 7.5
- Iowa 6.9

\*<http://apps.nccd.cdc.gov/uscs/cancersbystateandregion.aspx>

# Study Design

- CDC funded study, coordinated by Battelle
- The purpose of this pilot study was to develop an infrastructure for the systematic monitoring of HPV types in ICC (and other HPV-related cancers), test the feasibility, and obtain a baseline measurement of HPV types.
- Cancer registries included:
  - Initially:
    - **Kentucky, Louisiana, Michigan, and Florida (3 counties); years 2004-2005**
  - Residual Tissue Repositories added later:
    - **Hawaii; years 2000-2004**
    - **Iowa and Los Angeles; years 1994-1995**

# Study Design (cont)

- Each registry followed a common study protocol for selecting cases and submitting tumor tissue samples (embedded in paraffin) to CDC for HPV typing.
- 779 samples for females diagnosed with ICC from all seven states were successfully submitted and typed.

# Study Variables

- Selected variables from the cancer registries were linked with the HPV typing results from CDC.
- Variables from the cancer registries included:
  - Demographics: age, race/ethnicity, state and county of residence, urban/rural location
  - Clinical: stage, histology, grade, survival status

# Study Variables

## Hierarchical HPV types from CDC

HPV-16

```
graph TD; A[HPV-16] --> B[If not HPV-16, then HPV-18]; B --> C[If not HPV-18, then positive for types 31, 33, 35, 39, 45, 51, 52, 56, 58, 59, 66, 68]; C --> D[If not, then positive for other HPV types]; D --> E[HPV negative];
```

If not HPV-16, then HPV-18

If not HPV-18, then positive for types 31, 33, 35, 39, 45, 51, 52, 56, 58, 59, 66, 68

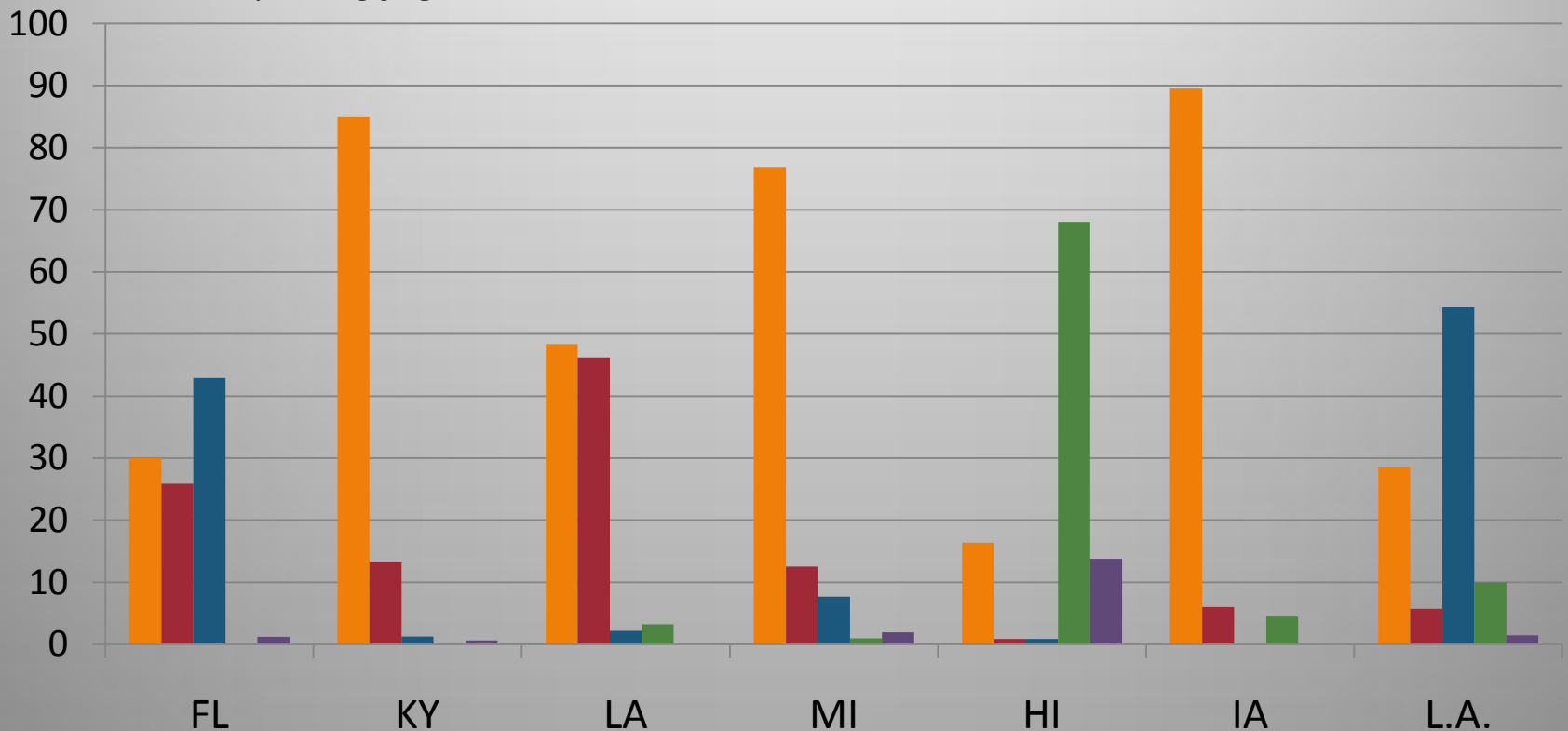
If not, then positive for other HPV types

HPV negative

# Demographics by State

## Race

- % White, non-Hispanic
- % Black, non-Hispanic
- % Hispanic
- % Asian, Pac Isl
- % All other



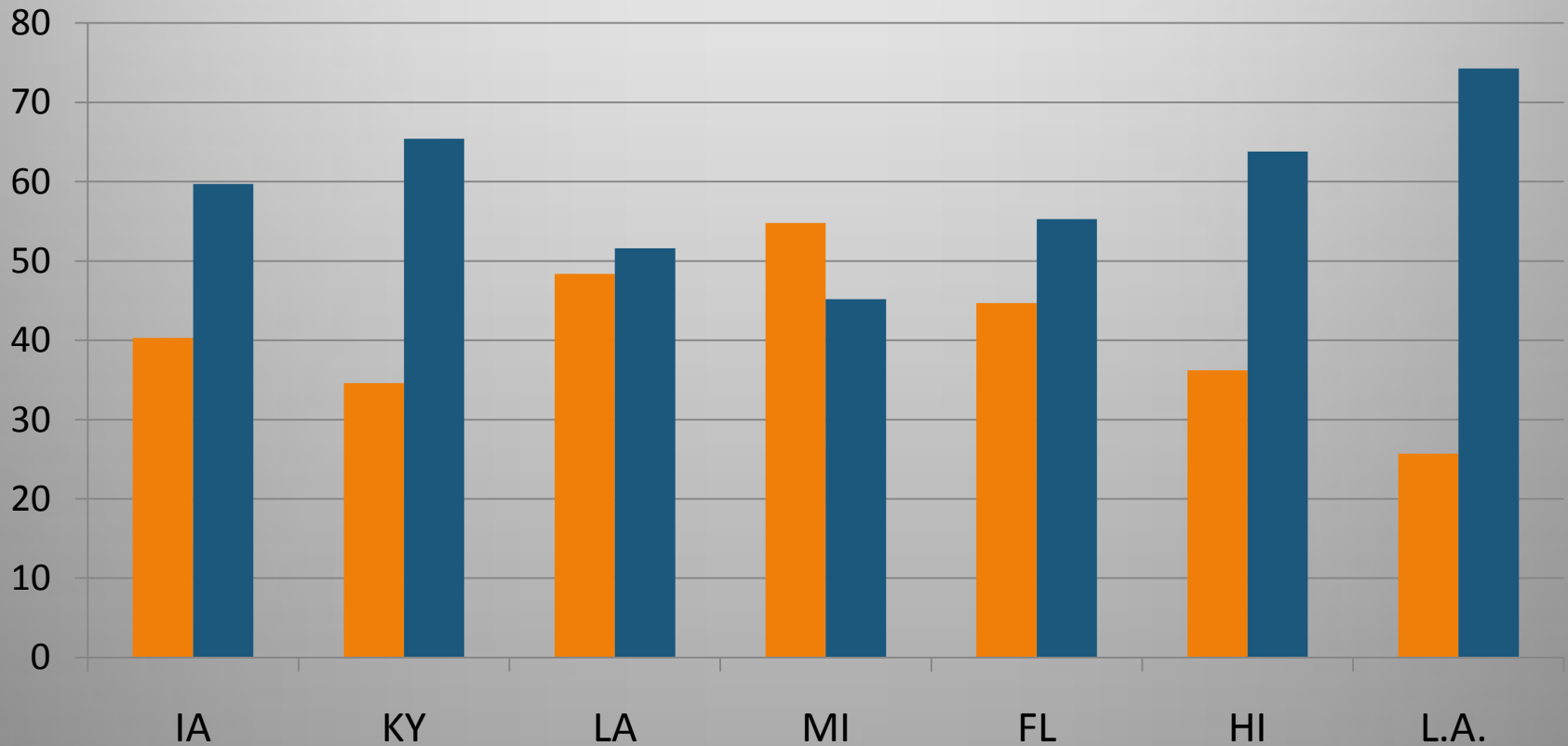
L.A. = Los Angeles



# Demographics by State

## Age Groups

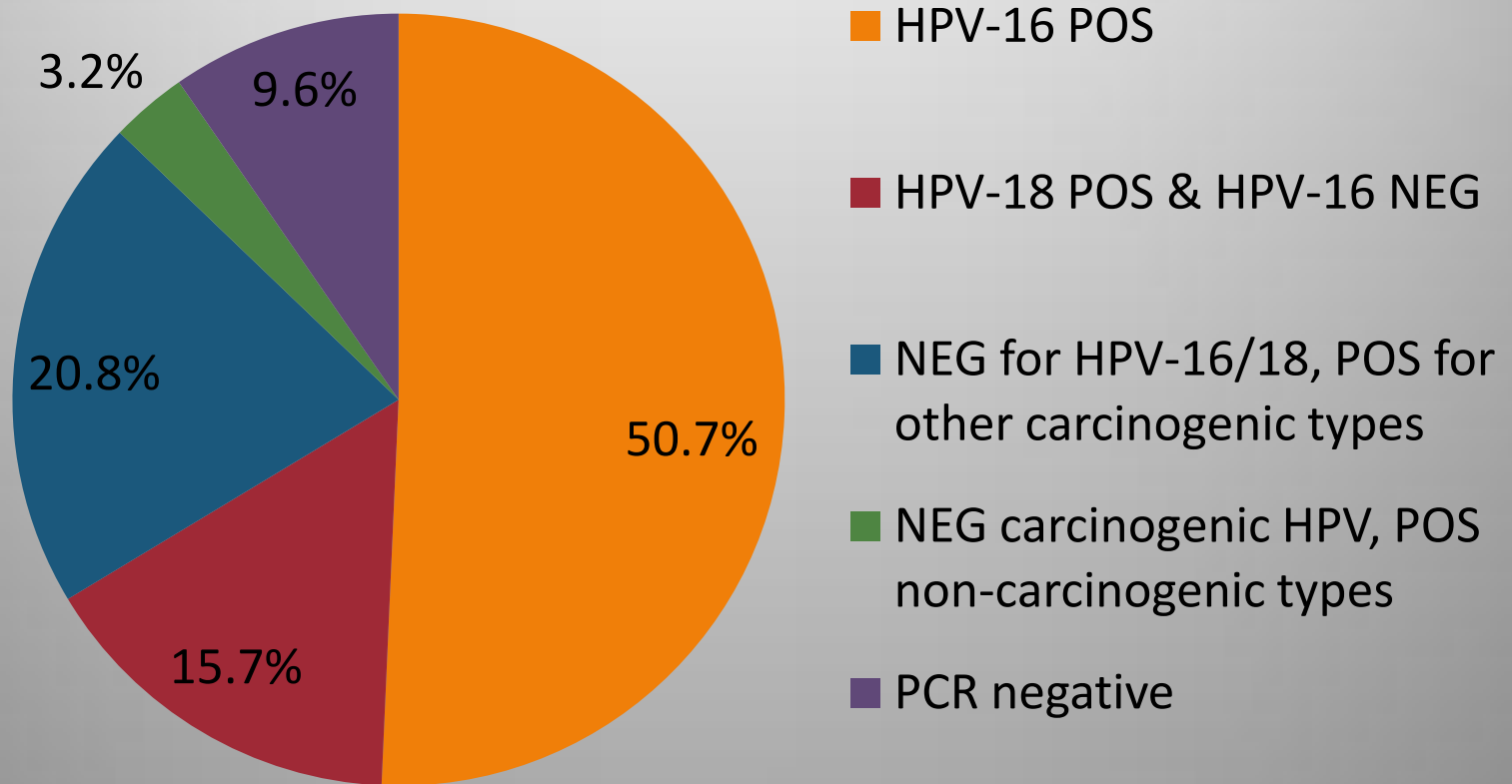
■ % <50 ■ % 50+



L.A. = Los Angeles

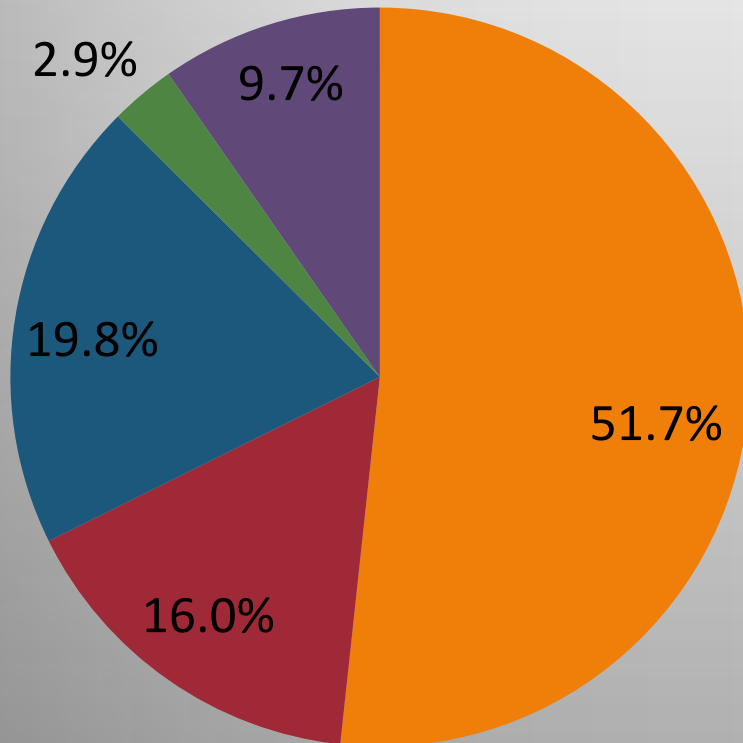
# Distribution by HPV Types

## All States

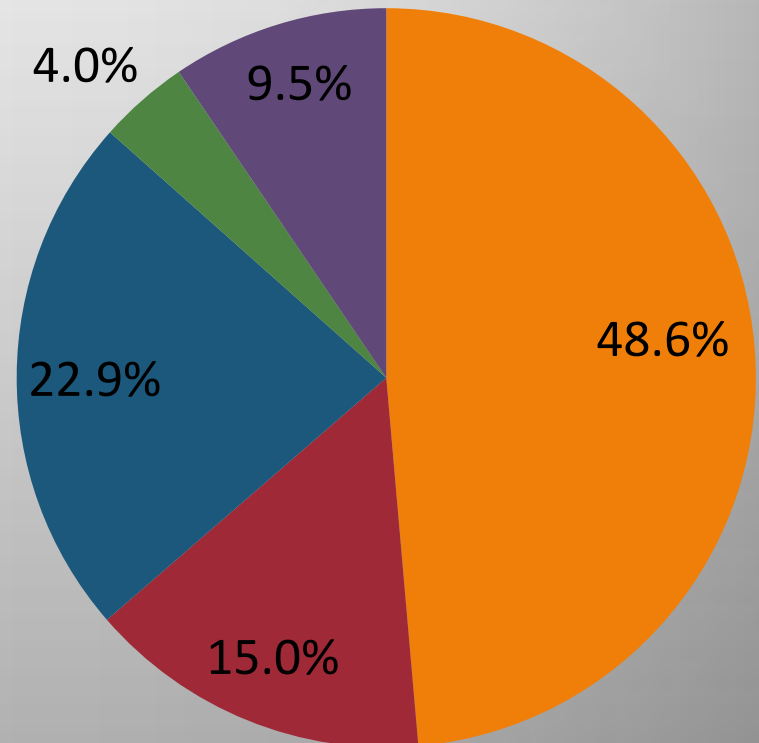


# Distribution by HPV Types

FL, KY, LA, MI (n=526)

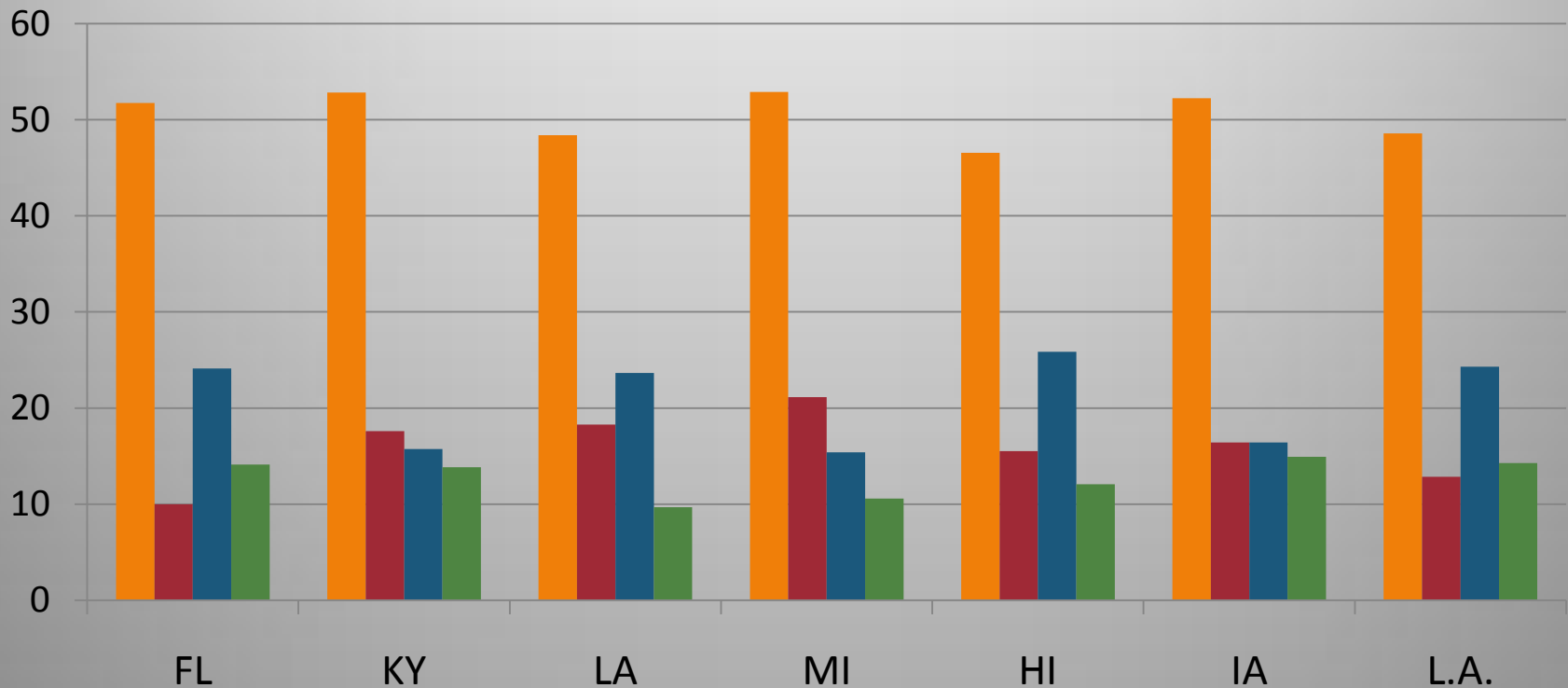


HI, IA, Los Angeles (n=253)



# HPV Types by State

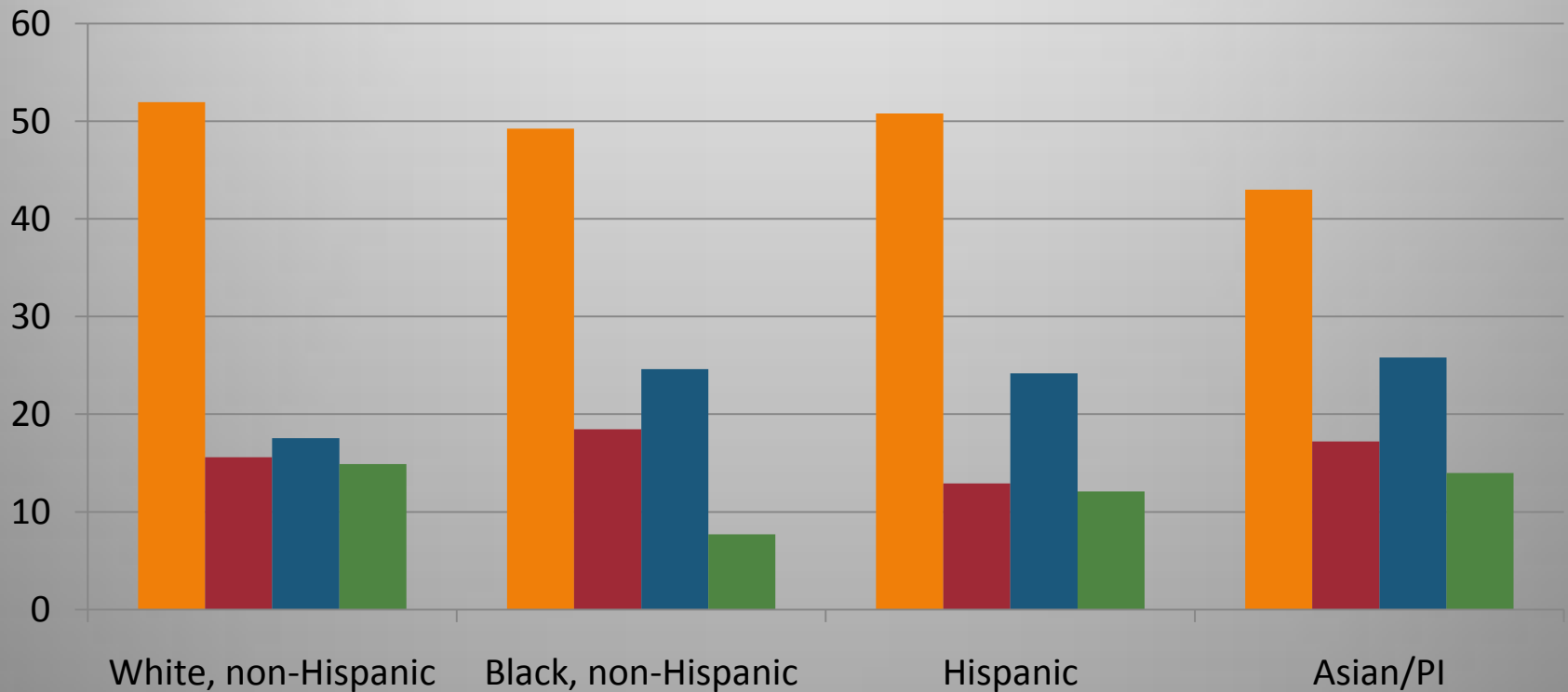
- % HPV-16 POS
- % HPV-18 POS & HPV-16 NEG
- % POS for other carcinogenic
- % NEG for carcinogenic



L.A. = Los Angeles

# HPV Types by Race

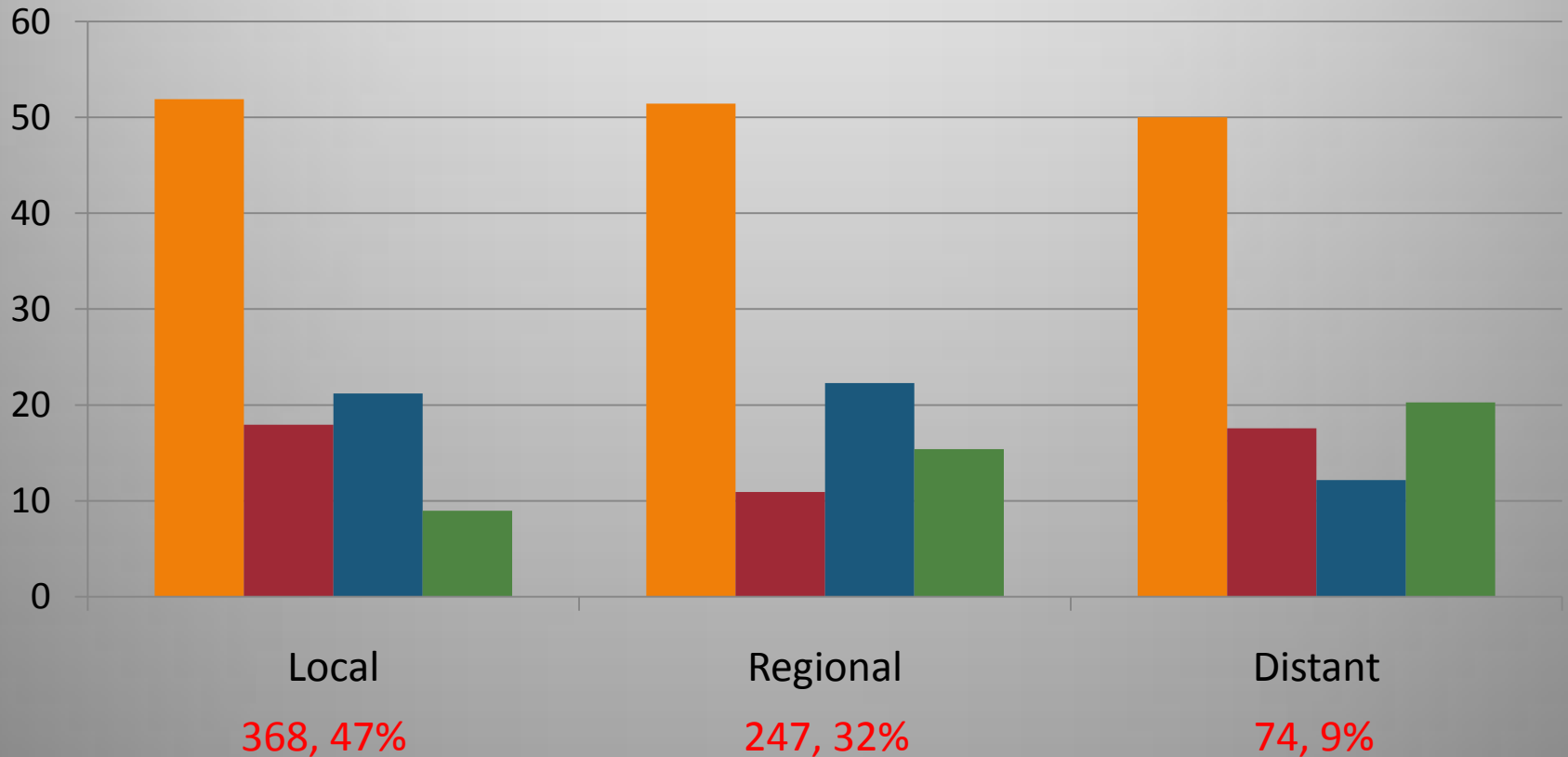
- % HPV-16 POS
- % POS for other carcinogenic
- % HPV-18 POS & HPV-16 NEG
- % NEG for carcinogenic



Other races = 22 cases (2.8%)

# HPV Types by Stage

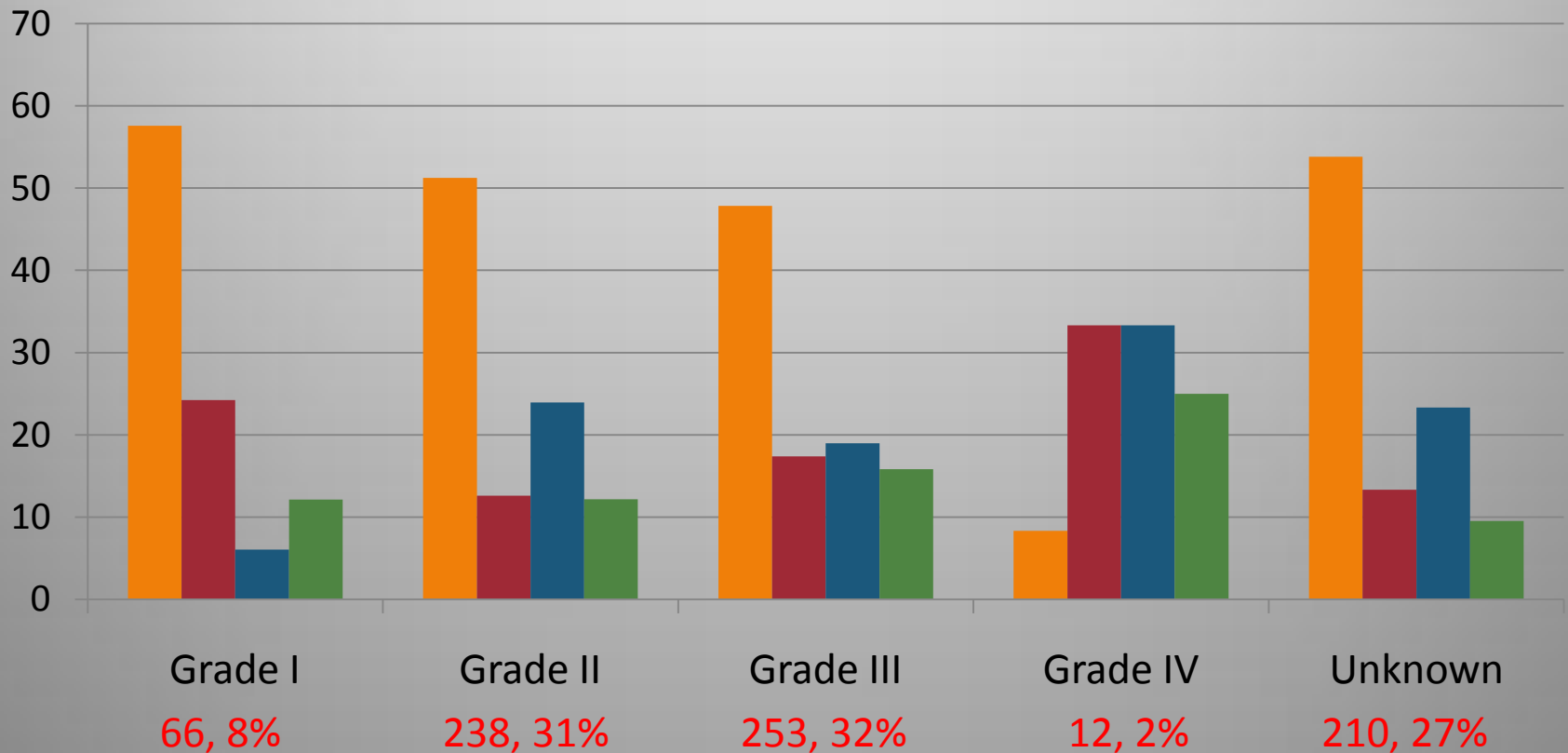
- % HPV-16 POS
- % POS for other carcinogenic
- % HPV-18 POS & HPV-16 NEG
- % NEG for carcinogenic



Unknown = 90 cases (12%)

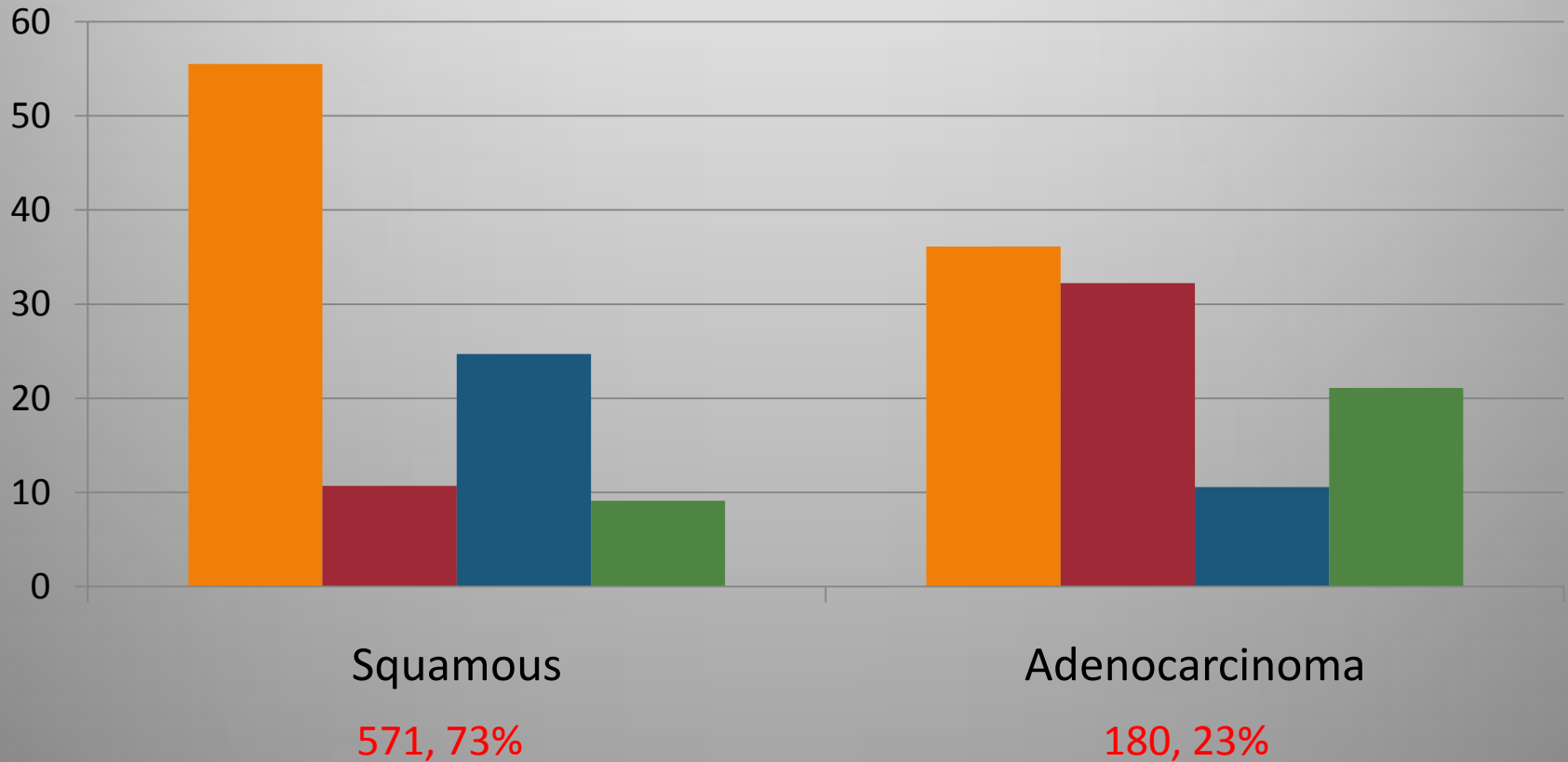
# HPV Types by Grade

■ % HPV-16 POS                      ■ % HPV-18 POS & HPV-16 NEG  
■ % POS for other carcinogenic   ■ % NEG for carcinogenic



# HPV Types by Histology

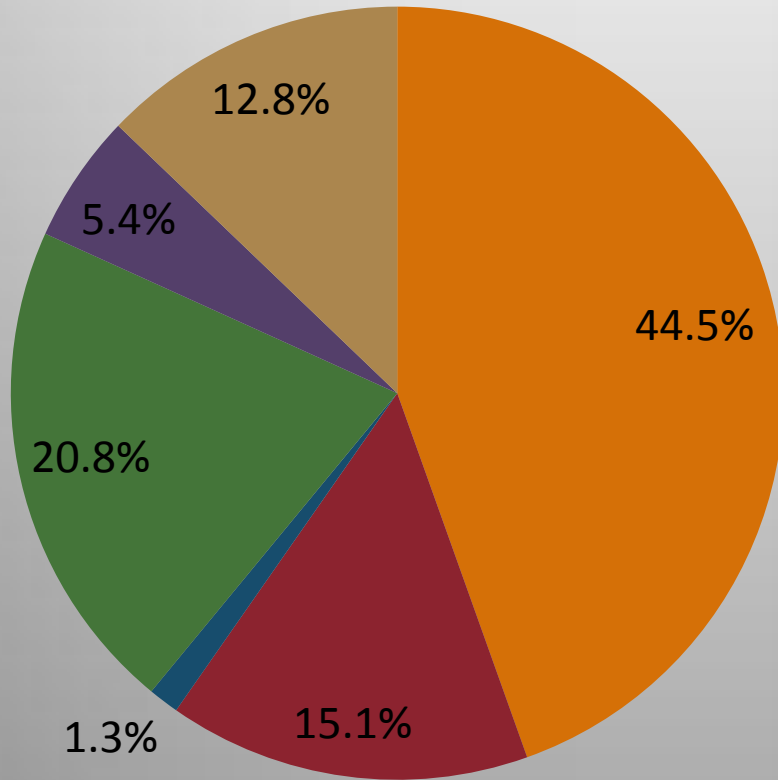
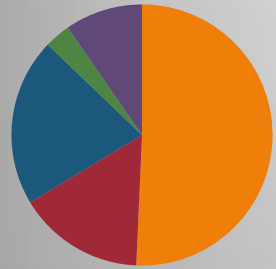
- % HPV-16 POS
- % POS for other carcinogenic
- % HPV-18 POS & HPV-16 NEG
- % NEG for carcinogenic



All other types = 28 cases (4%)



# A Different Grouping of HPV Type



- HPV-16 only
- HPV-18 only
- HPV-16 & HPV-18
- Other carcinogenic HPV
- HPV 16/18 & other carcinogenic HPV
- Negative for carcinogenic HPV

# Conclusions

- Overall, our study population followed expected HPV distributions, with 71% being HPV 16 and/or 18, 21 % other carcinogenic types combined, and about 13% negative.
- Variations were observed across age and race; women over 50 were more likely to be carcinogenic for other types or negative; White-non-Hispanics having the lowest proportion of other carcinogenic types, and Asian/Pacific Islanders the lowest proportion of HPV-16
- Variations were observed across stage and grade
- Greatest variations observed across histology, with adenocarcinomas having lower HPV 16, higher HPV 18 and higher negatives.

# Acknowledgements/Coauthors

- T Tucker, A Christian, WJ Christian - University of Kentucky
- M Saraiya, ER Unger, M Steinau - CDC
- C Lyu - Battelle
- E Peters - Louisiana State University
- G Copeland - Michigan Department of Community Health
- E Wilkinson - University of Florida
- B Hernandez - University of Hawaii
- Y Huang - Florida Department of Health
- CF Lynch - University of Iowa
- M Sibug Saber - University of Southern California