

*Using Molecular Typing of  
Tuberculosis Isolates to Assess  
Recent Transmission Among  
Homeless Persons and Drug Users  
in California*

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# *Background*

- The incidence of tuberculosis (TB) in California and in the U.S. has declined for the past several years.
- Transmission continues to occur, particularly in populations where control activities are difficult.
- It is difficult to quantify and characterize TB transmission. Analysis of genotype clustering has been used to make inferences about recent transmission on a statewide level.
- Anecdotal evidence from recent outbreak investigations show that there are risk factors for clustering.

# *Selected Set of Outbreaks in California*

| # outbreak cases | Years   | Risk factor                     | US-born cases | Foreign-born cases |
|------------------|---------|---------------------------------|---------------|--------------------|
| 24               | 2006-07 | Homeless                        | 15            | 9                  |
| 19               | 2004-07 | Homeless                        | 19            | 0                  |
| 17               | 2004-07 | Community transmission/Drug use | 17            | 0                  |
| 7                | 2002-07 | Drug use                        | 7             | 0                  |
| 7                | 2004-07 | Homeless                        | 6             | 1                  |
| 6                | 2006-07 | Homeless                        | 4             | 2                  |
| 6                | 2006-07 | Drug use/AIDS                   | 6             | 0                  |
| 4                | 2005-07 | Homeless/drug users             | 2             | 2                  |

# Methods

- California genotyping and surveillance data were combined to assess and compare clustering rates by:
  - The presence of homelessness and/or drug users (H/DU) as indicated on the surveillance report
  - Country of origin
- Definition of clustering:  $\geq 2$  cases in California that share an identical spoligo- and MIRU-type
- To minimize selection bias, counties that submitted  $< 80\%$  of isolates from culture (+) cases were excluded.
- The 2 largest genotype clusters in California were excluded because these clusters are difficult to interpret.
- Chi-square analysis to test association

# ***Genotype Clustering of Cases by Risk Factor and Country of Origin***

|              | <b>Clustered</b> |     | <b>Not clustered</b> |     | <b>Total</b> | <b>P-value</b> |
|--------------|------------------|-----|----------------------|-----|--------------|----------------|
| All cases    | 1355             | 56% | 1061                 | 44% | 2425         |                |
| H/DU         | 218              | 74% | 75                   | 26% | 293          | <0.0001        |
| Not H/DU     | 1137             | 53% | 995                  | 47% | 2132         |                |
| U.S.-born    | 369              | 70% | 155                  | 30% | 524          | <0.0001        |
| Foreign-born | 980              | 52% | 911                  | 48% | 1891         |                |

Country of origin was unknown for 10 cases

# ***Genotype Clustering of Cases by Risk Factor Stratified by the Country of Origin***

|                        | Clustered |     | Not clustered |     | Total | P-value |
|------------------------|-----------|-----|---------------|-----|-------|---------|
| <b>U.S.-born cases</b> |           |     |               |     |       |         |
| H/DU                   | 130       | 81% | 31            | 19% | 161   | 0.0006  |
| Not H/DU               | 239       | 66% | 124           | 34% | 363   |         |
| <b>Foreign-born</b>    |           |     |               |     |       |         |
| H/DU                   | 86        | 66% | 44            | 34% | 130   | 0.0007  |
| Not H/DU               | 894       | 51% | 867           | 49% | 1761  |         |

Country of origin was unknown for 10 cases

# CONCLUSIONS

- The data suggests that TB is more likely to be due to recent transmission in both U.S.- and foreign-born persons that are homeless and/or drug users
- The data suggest that some foreign-born persons are more likely to be linked to recent transmission.
- Although not quantifiable by genotyping data, recent transmission in foreign-born persons in the U.S. needs to be taken into account when developing TB control strategies
- Understanding risk factors and settings in which TB transmission occurs is important for TB control

# *LIMITATIONS*

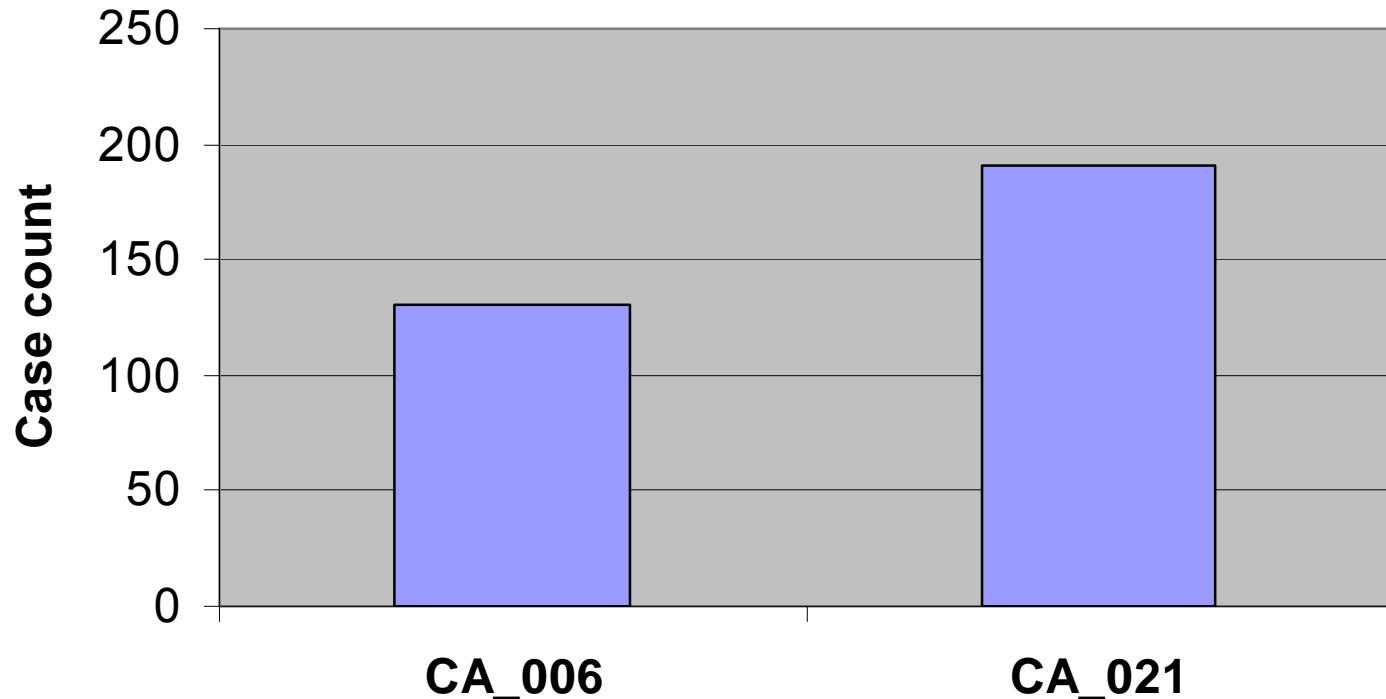
- Genotyping is not universally done in California.
- H/DU may be underreported on the case surveillance reports
- Spoligo- and MIRU-typing is not a perfect tool. Epidemiologically unrelated cases may have the same spoligo- and MIRU-type.
- The clustering definition may have overestimated recent transmission.
- Using a different perspective and time frame changes the proportion of clustering. However, the conclusions of recent transmission among different groups (i.e., with and without risk factors, U.S.- and foreign-born) stayed the same.

# Questions?

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# The Two Largest Clusters in California, 2004-2006



% of CA cases

5%

7%

% Foreign-born

88%

81%

Major race/eth. group

79% Asian

72% Asian