

# Pneumococcal Disease and Its Prevention in Alaska

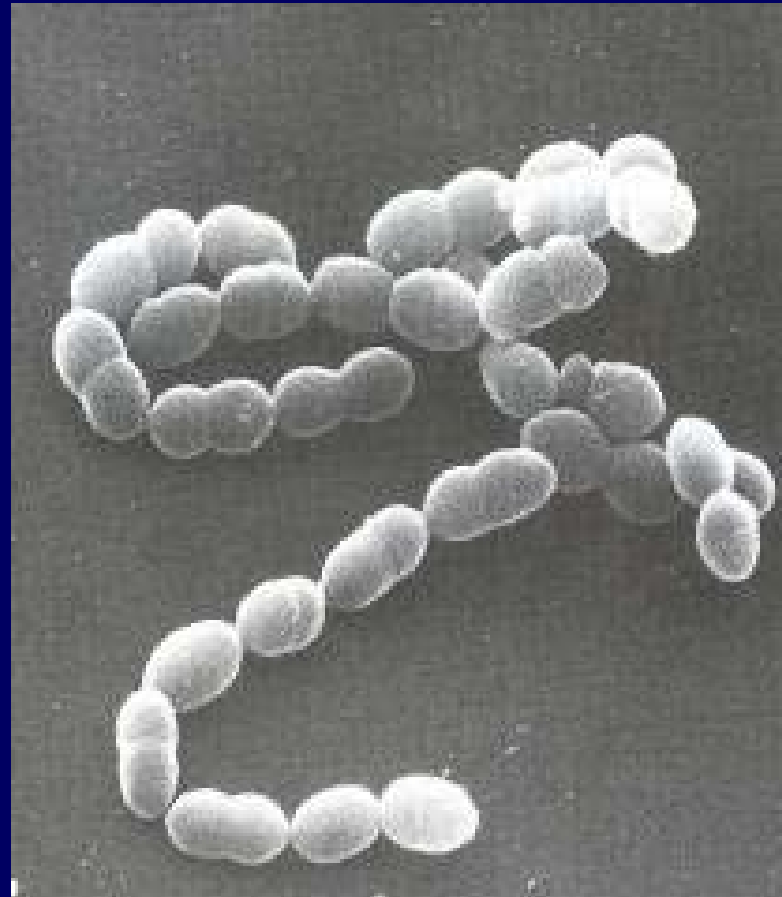
Tammy Zulz, MPH  
Ros Singleton, MD, MPH  
Jay Wenger, MD

Arctic Investigations Program  
Centers for Disease Control and Prevention  
Anchorage, Alaska  
907-729-3404  
[jdw2@cdc.gov](mailto:jdw2@cdc.gov)



# *Streptococcus pneumoniae* Pneumococcus (Pneumo)

- Pneumo is a bacteria



*Pneumo bacteria*

# Pneumo

*Pneumonia –  
lung infections*

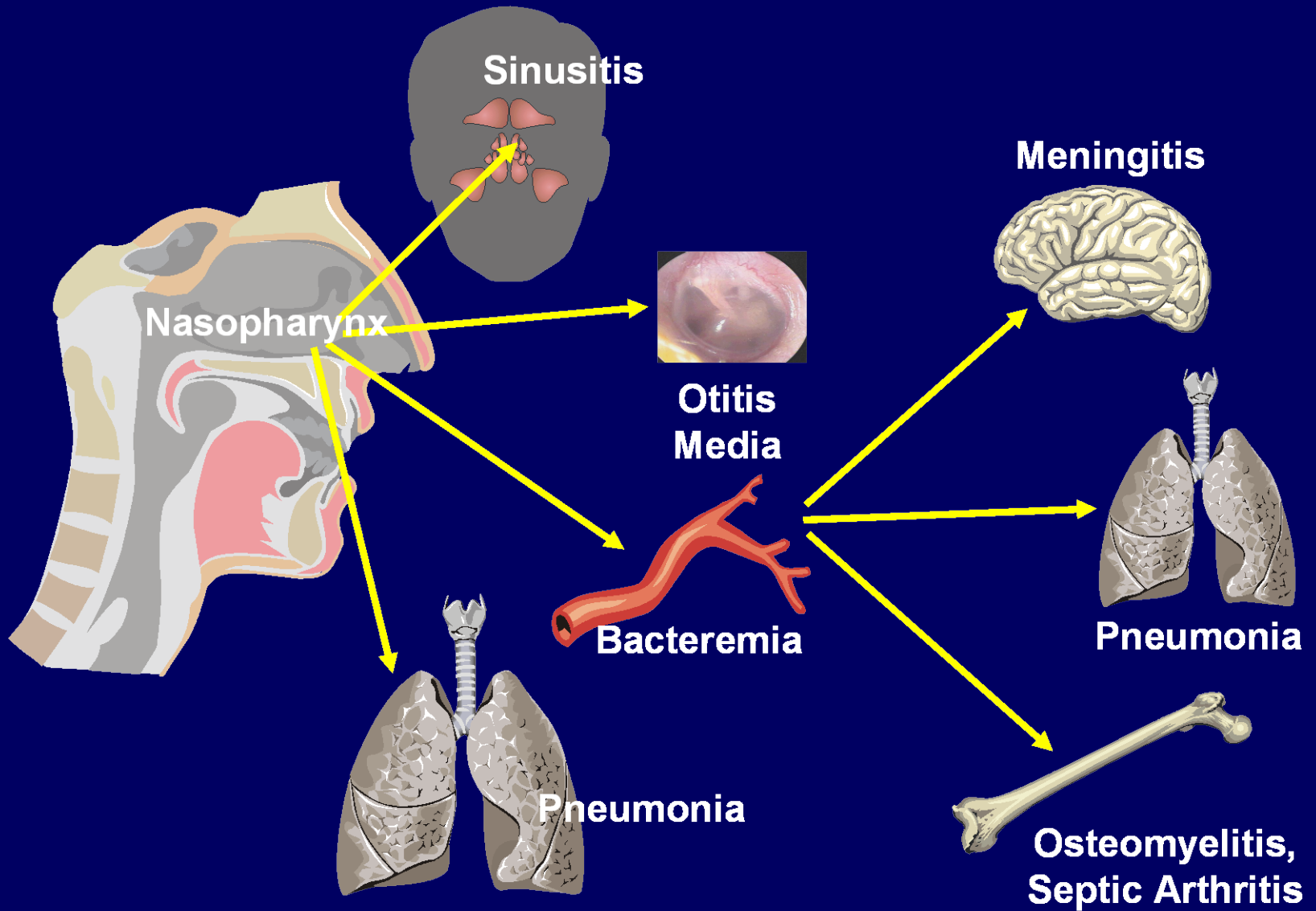


● A major cause of serious infections:

- ◆ Pneumonia
- ◆ Bacterial meningitis
- ◆ Blood infections

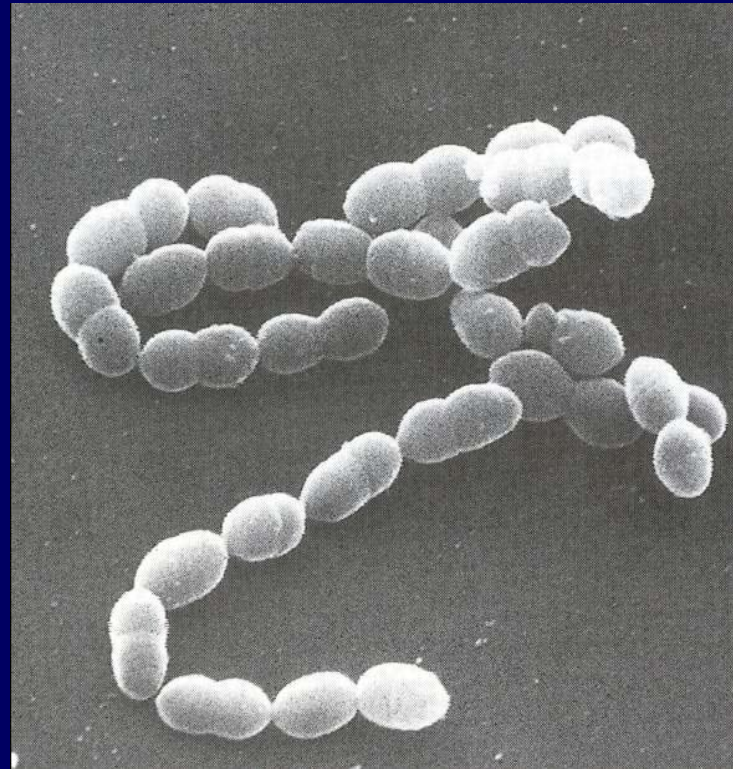
*Brain:  
meningitis*



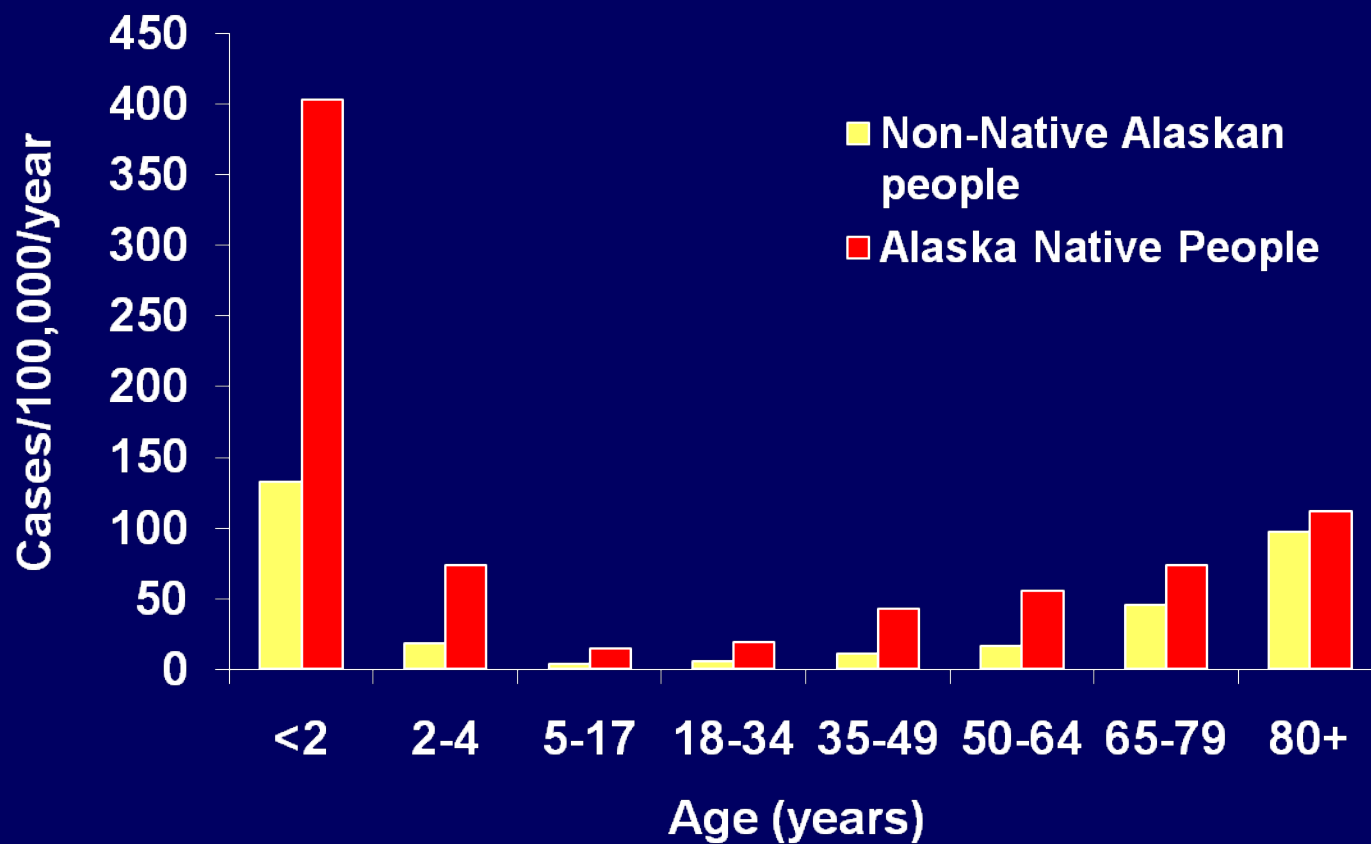


# Pneumo

- Over 90 flavors, or serotypes, based on outer surface of the bacteria
- Before conjugate vaccine, 7 serotypes caused
  - ◆ ~ 75% of serious pneumo disease
  - ◆ Most antibiotic resistant infections



# Invasive Pneumo Disease in Alaska, 1996-2000



# Polysaccharide vaccine

- Made of material from 23 of the most common serotypes
- Produces protective antibody in adults, but not much in children
- Recommended in Alaska for
  - ◆ All adults 65 years old or older
  - ◆ Alaska Native adults 50 years and older
  - ◆ Others 2 years and older with specific risk factors for pneumo disease

# How can we protect children ?

## A conjugate vaccine

- Attach something children do respond to (protein) to the polysaccharides
- Put the most common serotypes in the vaccine

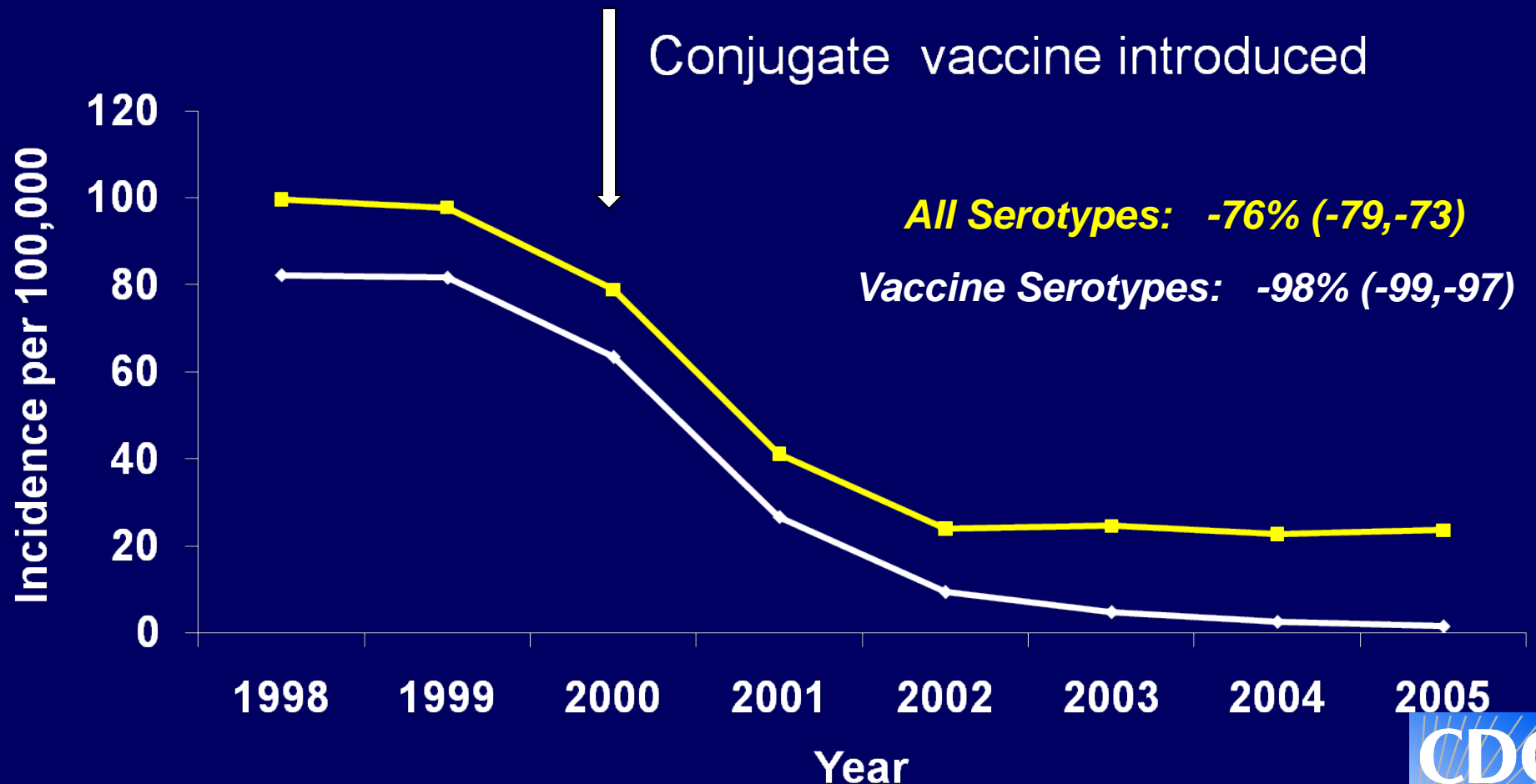


# Pneumo conjugate vaccine schedule

- Introduced in 2001
- Primary series
  - ◆ 2, 4 and 6 months of age
  - ◆ With other childhood vaccines
- Booster dose at 12-15 months

# Vaccine Impact:

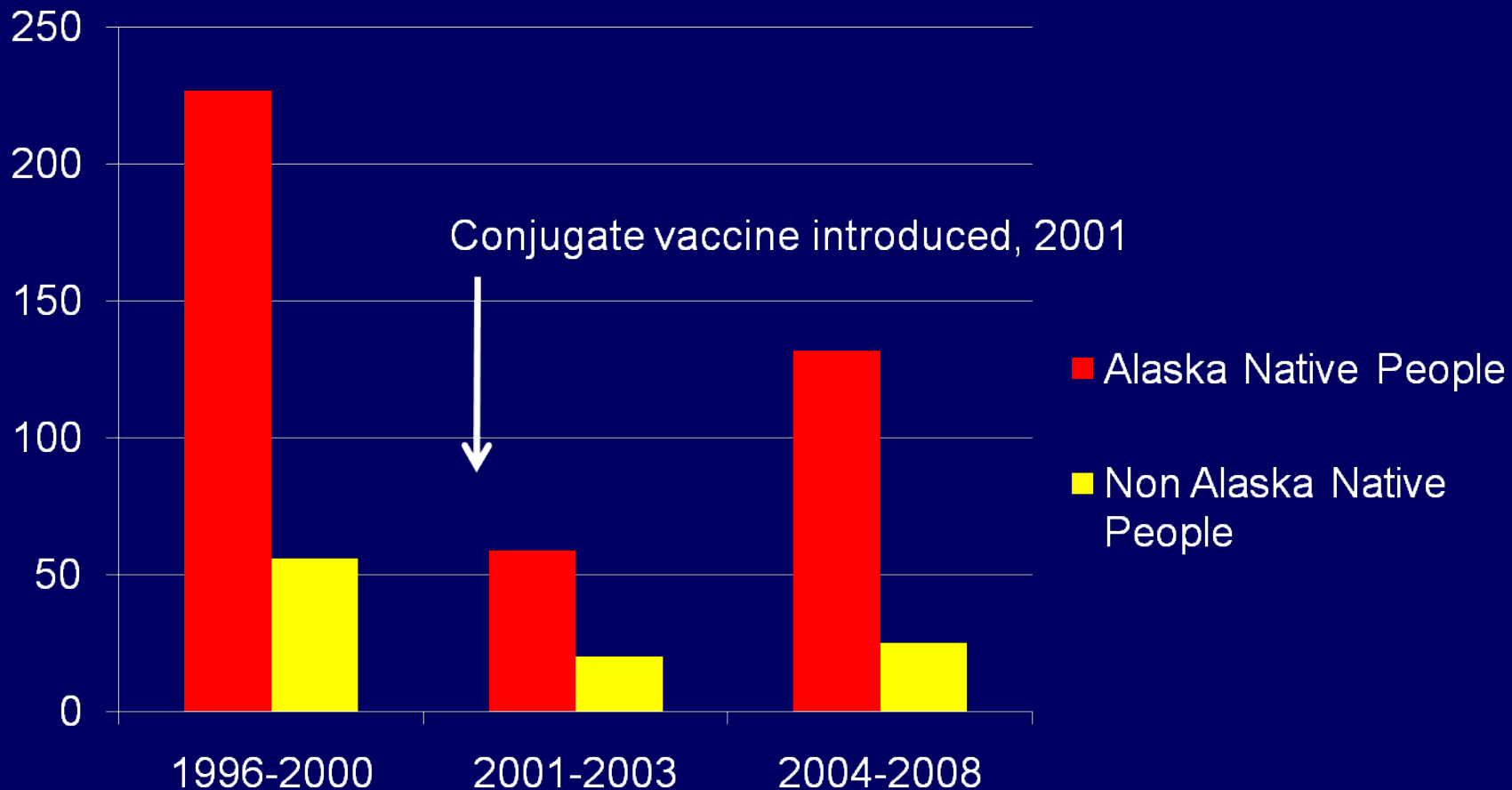
## Decrease in pneumo disease in US children



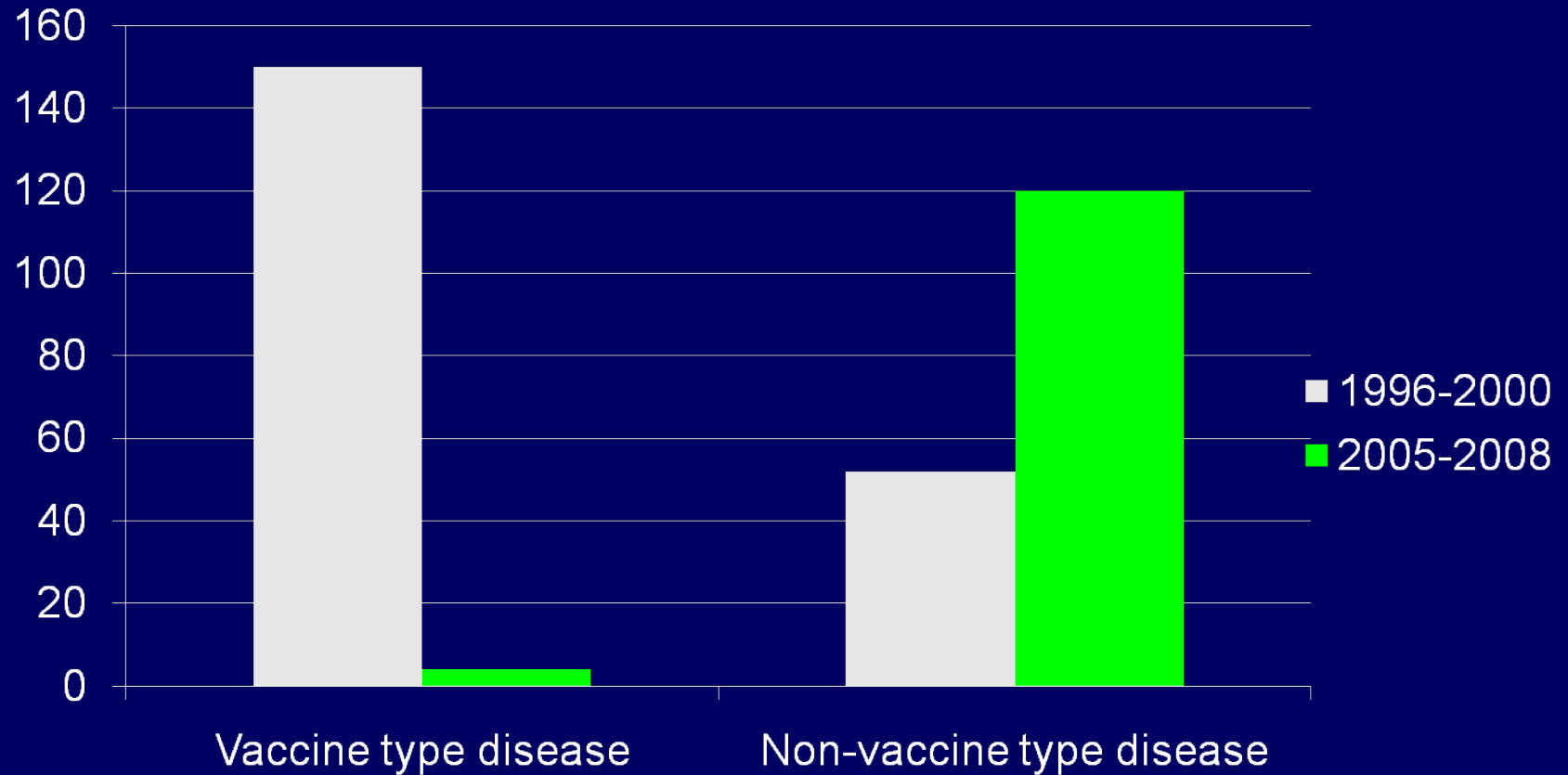
# Conjugate Vaccine Impact in the US

- 75% decrease in invasive pneumo infections in US children.
- In 2006 in the U.S. there were 30,000 fewer cases of invasive pneumo disease than before vaccine

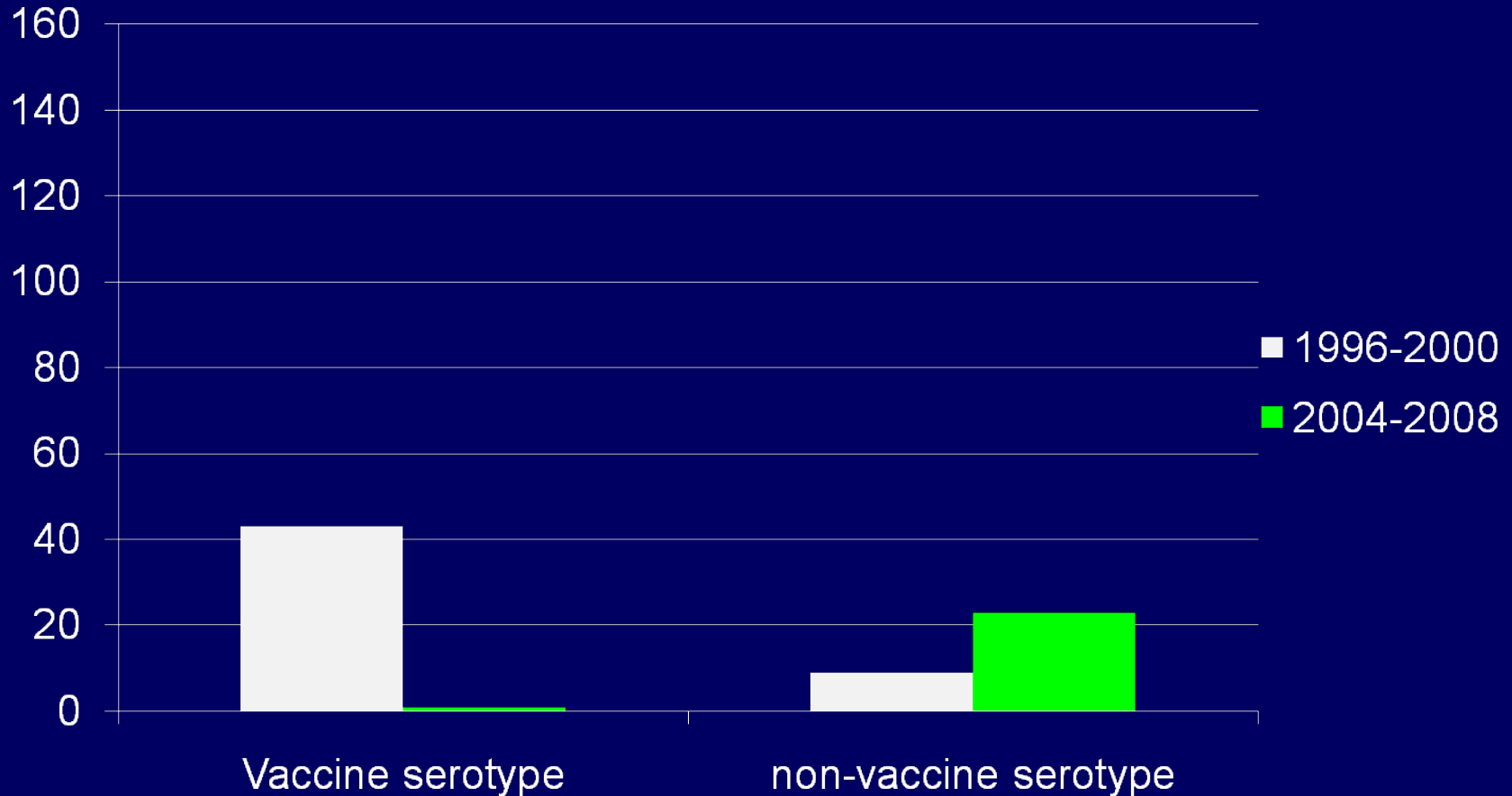
# Invasive pneumo disease in children < 5 in Alaska



# Pneumo disease in Alaskan Native children <5, pre and post conjugate vaccine



# Pneumo disease in non-Alaska Native children <5, pre and post conjugate vaccine



# Impact of pneumococcal conjugate vaccine

- Pneumo disease in the US went down a lot, but some disease caused by other types of pneumo
- In Alaska, a lot of disease caused by a few other pneumo, although not up to baseline, so we ended up preventing disease
- But we could do better . . . .

# So, what do we do now?

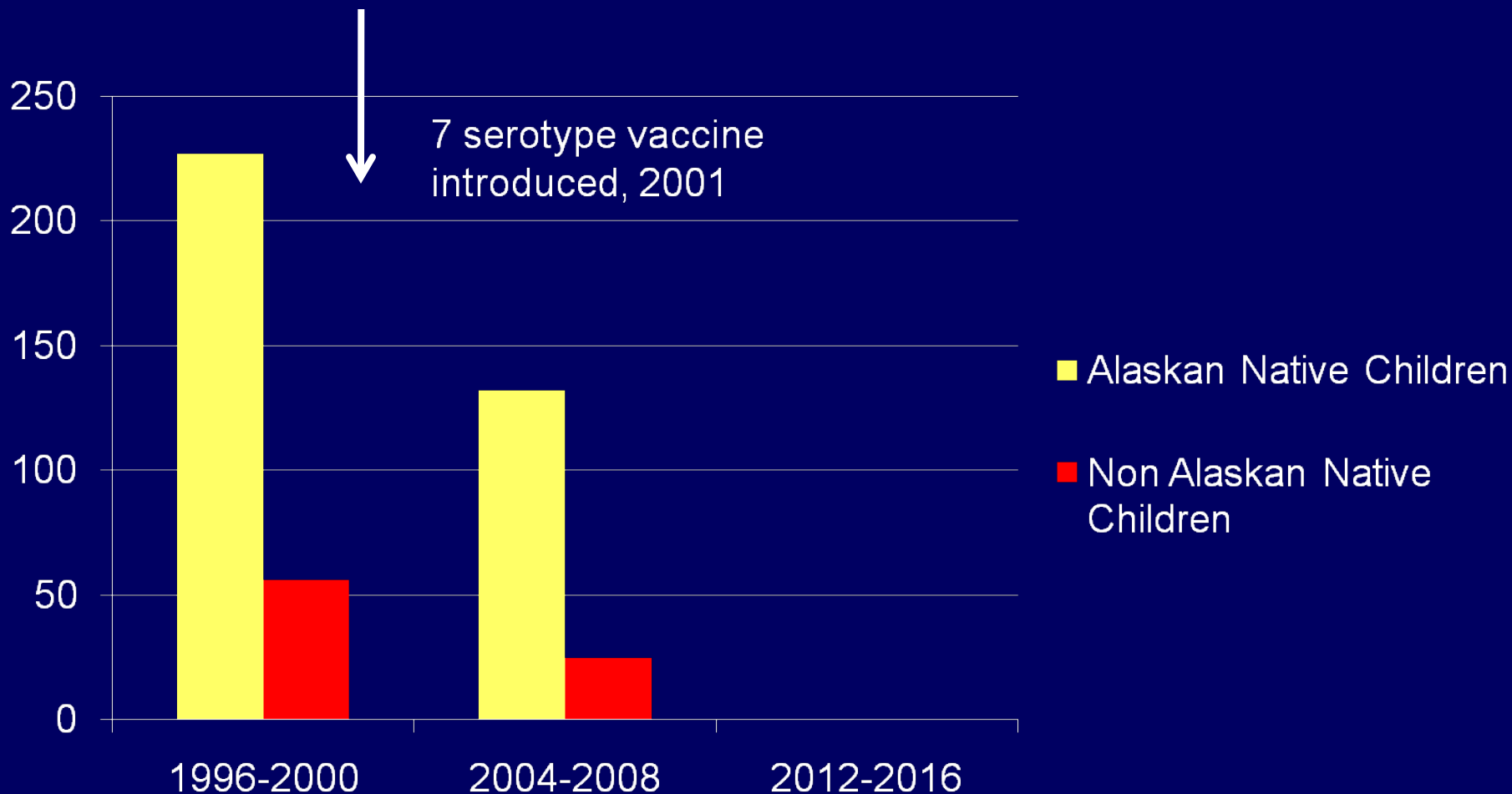
- A new vaccine - 13 serotype pneumo conjugate vaccine
- Covers serotypes causing almost 70% of remaining disease
- Licensed in February, 2010
- Replaced 7serotype vaccine



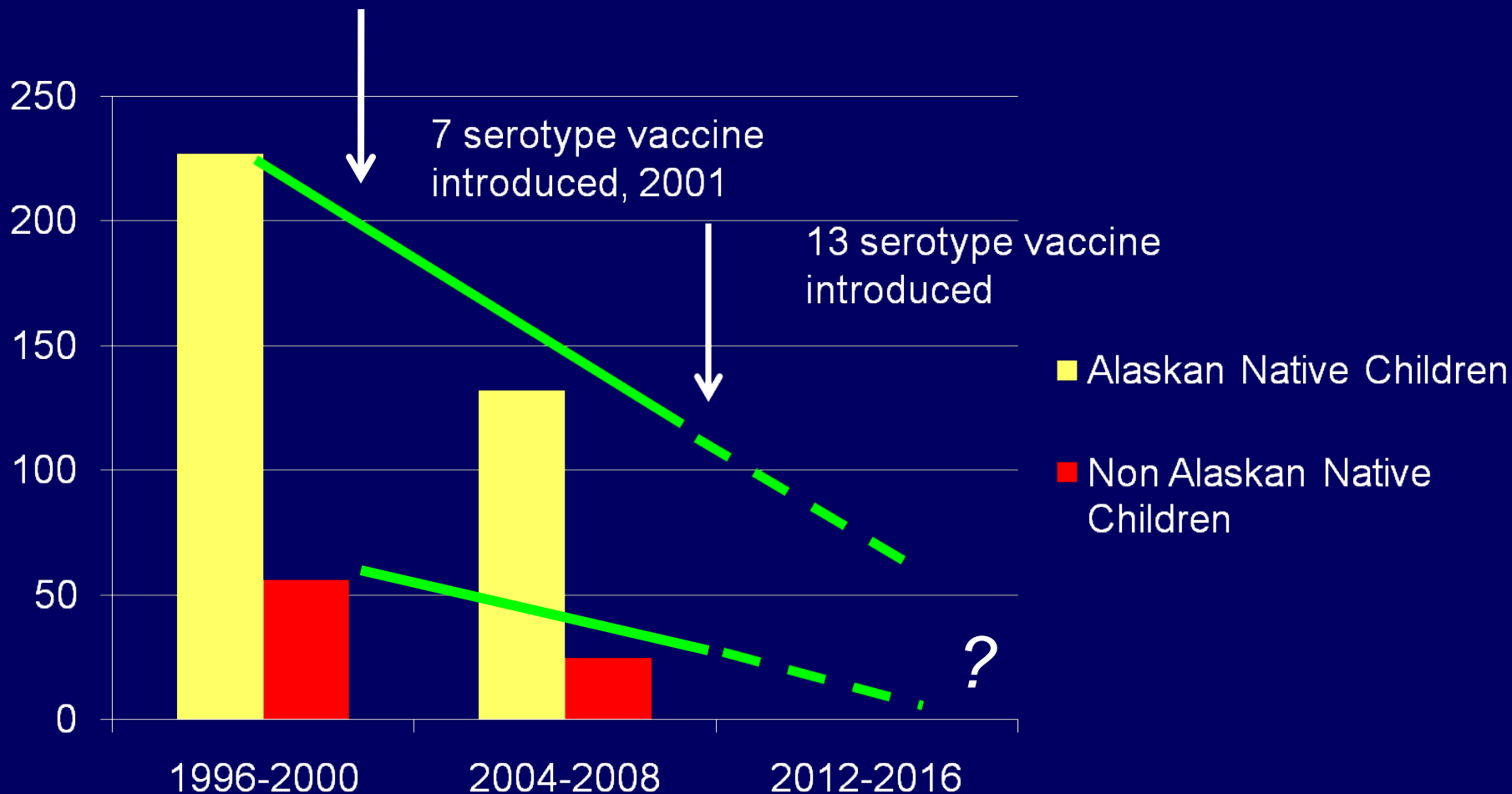
# Why should it work better this time?

- Pneumo serotypes vary in ability to cause serious disease
- Two main types are causing disease now, and they were just behind the 7 included in the old vaccine
- Remaining ones UNLIKELY to cause much disease

# Invasive pneumo disease in children < 5 in Alaska



# Invasive pneumo disease in children < 5 in Alaska



# Summary

- **Original conjugate vaccine highly successful decreasing serious vaccine-type pneumo disease**
- **Increase in non-vaccine types reduced the gains from vaccine**
- **Introduction of new vaccine this year expected to decrease disease further.**

Serotype	Period 1: 1996-2000 cases, (%)	Period 2:2005-2008 cases, (%)	Next Period ???
14* (PCV7)	67 (31)	-	
6B* (PCV7)	30 (14)	-	
19F* (PCV7)	27 (12)	1 (1)	
18C * (PCV7)	15 (7)	-	
9V * (PCV7)	12(6)	1 (1)	
23F * (PCV7)	11 (5)	1 (1)	
19A*	10 (5)	40 (33)	
4 * (PCV7)	9 (4)	-	
6A*	8 (4)	6 (5)	
1*	7 (3)	-	
7F*	5 (2)	25 (21)	
38	#	1 (1)	??
33F	3 (1)	4 (3)	?
15C	1 (0.5)	1 (1)	??
22F	3 (1)	5 (4)	?
10A	#	2 (2)	?
15B	1 (0.5)	1 (1)	??
12F	#	6 (5)	?
3*	#	7 (6)	
8	#	1 (1)	??

**Most common IPD serotypes in Alaskan children < 5 by time period.**

*(adapted from PIDJ 2010;29:251-256)*



# Solution to the problem?

## Conjugate vaccine with 7 serotypes

Eighty percent of infections in Alaskan children were caused by strains in the vaccine

