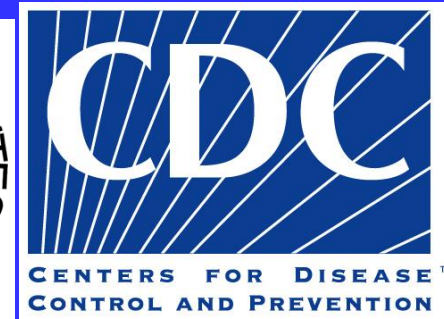


# Measles, Mumps and Rubella Seropositivity in Children with Perinatal HIV Infection

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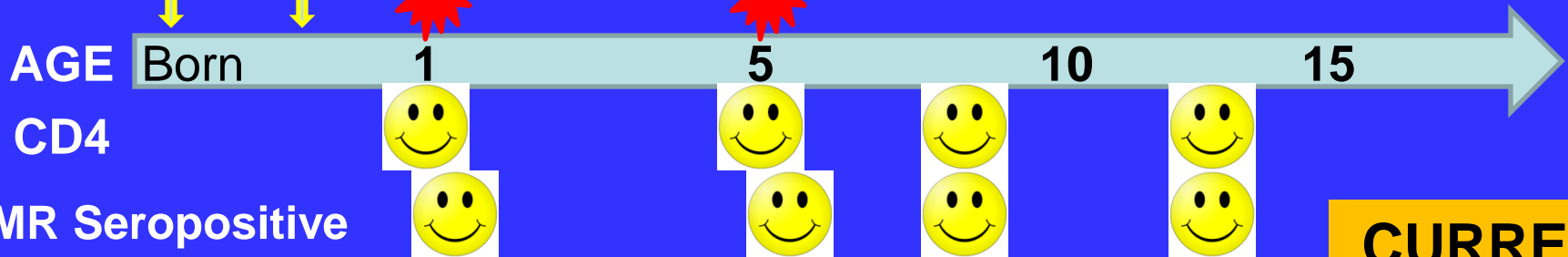
# Background & Rationale

- Today, most children and teens with HIV infection have strong immune systems and good HIV control thanks to antiretroviral therapy (ART).
- Children on ART usually respond well to vaccines.
- But many older children and teens on ART today got vaccines when they were infants or young children and not on ART.
- That means that our youth today may not be protected by the vaccines they got years ago.
- MMR is a vaccine that protects against 3 infections: measles, mumps and rubella (german measles). MMR is usually given to young children (at ages 1 and 5 years).
- This purpose of this study was to use blood testing to see if children in AMP still had protection from measles, mumps and rubella.

# Timing of MMR and ART in Relation to Immunity in Adolescence

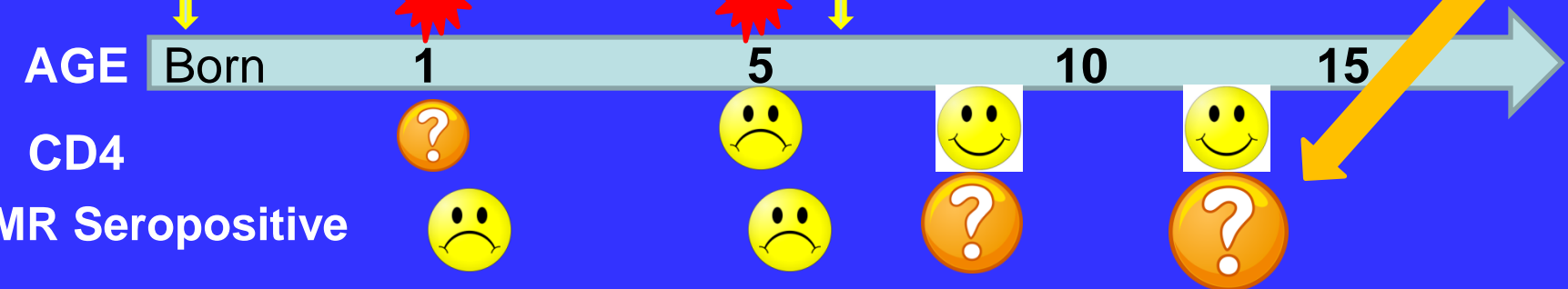
 = MMR

**HIV ART**



**HIV**

**ART**



**CURRENT STUDY FOCUS**

# Pediatric HIV-AIDS Cohort Study (PHACS)

- **All AMP participants included:**
  - **Perinatally HIV-infected (HIV+) or HIV-exposed uninfected (HEU)**
  - **Age 7 to <16 years at study entry**
  - **Complete medical history, including ART, lab results and immunizations\***
- **For present analysis:**
  - **Most recent study visit with blood specimen available**
- **\*Asked sites to double-check immunization records that seemed to be not up-to-date**



# Blood tests for evidence of immunity

- Measles
  - Specialized test by CDC [Plaque reduction neutralization, or PRN] for measles has been linked to protection against measles
  - Measles antibody test used in clinical care not as reliable
- Common blood antibody test for rubella correlates well with protection against rubella
- No good blood antibody test that says if person protected against mumps (only if antibody positive or negative)

# Baseline Characteristics

	PHIV	HEU	Total	P value
Number	428	221	649	
Age (range)	11.5 (7-15)	9.9 (7-15)	10.9 (7-15)	<0.01
Male sex	46%	52%	48%	0.163
Black race	75%	64%	71%	0.003
Mean BMI-Z	0.32	0.76	0.47	<0.001
≥ 1 MMR	99%*	97%*		0.356
≥ 2 MMRs	92%*	89%*		<0.005
VL < 400	68%	-		
CD4 > 500	77%	-		
CD4 % ≥ 25	77%			
CDC Class C	24%	-		
On ART	93%			

\*Based on site queries: PHIV ≥1 MMR 98% -> 99%; ≥2 MMR 91% -> 95% (<.001->.356)  
 HEU ≥1 MMR 92% -> 97%; ≥2 MMR 75% -> 89% (<.001-<.005)

# Measles and Rubella Seroprotection and Mumps Seropositivity Rates

	HIV Status	
	HIV-Infected	HEU
Measles (PRN)	245/428 = 57% (52%,62%)	218/221 = 99% (96%,100%)
Mumps	254/428 = 59% (55%,64%)	215/221 = 97% (94%,99%)
Rubella	279/428 = 65% (61%,70%)	217/221 = 98% (95%,99%)

# Seropositivity Among Youth with Well-controlled HIV

	<b>VL &lt; 400 copies/mL</b>	<b>CD4 count ≥ 500 cells/mm<sup>3</sup></b>
Measles	71%	78%
Rubella	69%	78%
Mumps	69%	76%

Poor seropositivity/seroprotection rates even among youth who currently have their HIV infection well controlled



# M-M-R results (HIV+ only) by number of vaccine doses received after on HAART for $\geq 3$ months

Number of vaccine doses received after on HAART $\geq 3$ months					
	0 (N=188)	1 (N=141)	2* (N=99)	Total (N=428)	P-Value (a)
<b>Measles (PRN)</b>					
Protected	78 (43%) 1 missing	78 (55%)	88* (85%)	244 (57%)	<.001
<b>Mumps</b>					
Seropositive	92 (51%)	81 (57%)	81 (78%)	254 (59%)	<.001
<b>Rubella</b>					
Protected	92 (51%)	99 (69%)	88 (85%)	279 (65%)	<.001

(a) Fisher's Exact Test \*Includes one subject who received 3 MMRs after  $\geq 3$  months of HAART.

- Reminder: 95% HIV+ had  $\geq 2$  MMR doses
- No effect of total # MMR doses on M-M-R serology result

# Summary & Implications

- Largest cohort PHIV+ children and youth on ART assessed for M-M-R immunity
- Large numbers of PHIV youth in the US may not be protected against measles, mumps and rubella
- Despite current use of ART, virologic suppression and high CD4 values
- Benefit of MMR after ART (Abzug 2012)
- No evidence that HEU lack protection

# Summary & Implications

- ***Evidence supporting new CDC (ACIP) recommendation for MMR reimmunization in PHIV who have not received MMR immunization while on effective ART (posted 6-Dec-2012)***

## Recommendations for Vaccination of Persons with HIV infection:

- Two doses of MMR vaccine for all persons aged  $\geq 12$  months with HIV infection who do not have evidence of current severe immunosuppression [i.e., for persons aged  $\leq 5$  years: must have CD4 percentages  $\geq 15\%$  for  $\geq 6$  months; and for persons aged  $> 5$  years: must have CD4 percentages  $\geq 15\%$  and CD4  $\geq 200$  lymphocytes/mm<sup>3</sup> for  $\geq 6$  months] or other current evidence of measles, rubella, and mumps immunity.
- The first dose should be administered at age 12 through 15 months and the second dose at age 4 through 6 years, or as early as 28 days after the first dose.
- Persons with perinatal HIV infection who were vaccinated prior to establishment of effective ART should receive two appropriately spaced doses of MMR vaccine once effective ART has been established [for persons aged  $\leq 5$  years: must have CD4 percentages  $\geq 15\%$  for  $\geq 6$  months; and for persons aged  $> 5$  years: must have CD4 percentages  $\geq 15\%$  and CD4  $\geq 200$  lymphocytes /mm<sup>3</sup> for  $\geq 6$  months] unless they have other acceptable current evidence of measles, rubella, and mumps immunity.

# THANK YOU!

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- PHACS participants and families and site personnel