Maternal Tdap Vaccination During Pregnancy and Immune Response: A Comparison Between Infants Born to Mothers Primed with Acellular or Whole Cell Pertussis Vaccines

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BACKGROUND

- Acellular pertussis (aP) vaccines replaced whole cell pertussis (wP) vaccines for the recommended childhood primary series in the United States in 1997.
- As women primed with aP vaccines in childhood enter reproductive age, it is unknown how maternal aP-priming will impact pertussis protection conferred to infants through Tdap (tetanus toxoid, reduced diphtheria toxoid and acellular pertussis) vaccination during pregnancy.

METHODS

- Infants born at term to women who had been vaccinated with Tdap at 27-36 weeks' gestation and ≥14 days prior to delivery were included.
- Geometric mean concentrations (GMC) of pertussis-specific antibodies (measured in IU/mL) in umbilical cord blood of infants born to women born after 1997 (aP vaccine primed) were compared with those born to women born before 1992 (wP vaccine primed).

RESULTS

- 253 and 506 neonates born to aP- and wP-primed women, respectively, were included.
- Compared with wP-primed women, aP-primed women were younger (19.3 v. 24.5 years), more likely to be Hispanic or non-Hispanic black and to have infants with lower birthweight (3264 v. 3392 grams, p<0.01 for all).
- Gestation at Tdap receipt, gestational age at delivery, and interval between Tdap administration and delivery were not statistically different.
- Antibodies against pertussis toxin (PT) and filamentous hemagglutinin (FHA) were significantly lower among neonates born to aP-primed versus wP-primed mothers (PT: 17.3 v. 36.4, GMC ratio 0.475 (0.408 – 0.552) (Figure); FHA: 104.6 v. 121.4, GMC ratio 0.861 (0.776 – 0.958)).
- No significant differences were observed between the aP and wP-primed groups for anti- fimbriae (FIM) or anti-pertactin (PRN) antibodies ((FIM: 469.6 v. 577.2, GMC ratio 0.81 (CI 0.65 – 1.01); PRN 338.8 v. 292.6, GMC ratio 1.16 (CI 0.99 – 1.35)).

- **The type of pertussis vaccine a woman received during childhood significantly impacted her response to Tdap vaccination during pregnancy**
- **Anti-PT antibodies were lower in infants born to aP-primed women compared with those born to wP-primed women**
- **Infants born to aP-primed women who received Tdap during pregnancy may have less passive protection against pertussis during the first months of life than those born to wP-primed women.**

Results

Figure 1. Anti-PT antibody levels in cord blood in infants born to women in who were primed with acellular pertussis vaccines in childhood compared with those primed with whole cell pertussis vaccines in childhood. Bars show histogram of proportion of infants in each group by antibody range; lines show smoothed kernel density.

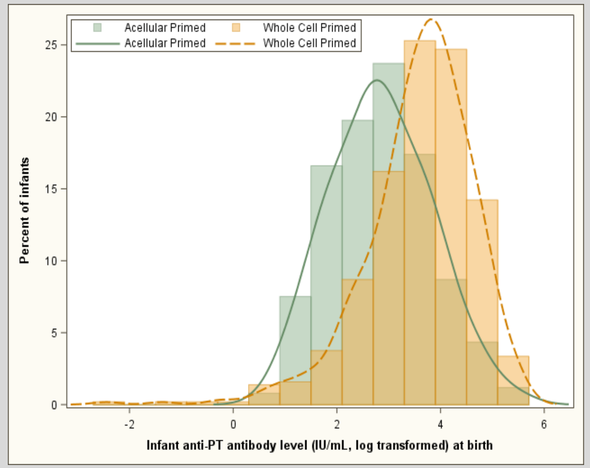
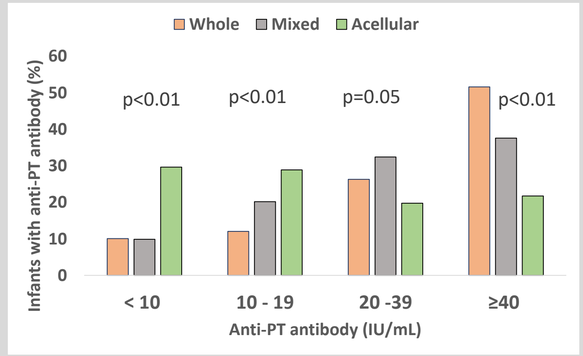


Figure 2. Proportion of infants with anti-PT antibody levels by PT antibody level category and type of childhood pertussis vaccine received by the mother. P-values shown are for the comparison between the whole cell pertussis (wP) and acellular pertussis (aP) groups.



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