

STRONG CHILDREN'S RESEARCH CENTER

Summer 2018 Research Scholar

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ABSTRACT

Title: *Evaluation of Previous Childhood Exposure to Live Attenuated and Inactivated Influenza Vaccines on the Influenza-Specific Antibody Response*

Background: Acute influenza infection, live attenuated influenza viruses ("LAIV"), and inactivated influenza vaccines ("IIV") are the main methods of influenza exposure for infants and young children. The LAIV vaccine is administered intranasally to children aged ≥ 2 years and stimulates the innate immune system, while IIV is an intramuscular vaccine administered to children ≥ 6 months of age and is composed of predominately HA surface glycoproteins with only trace amounts of innate immune activators. While historical data suggests greater efficacy of LAIV, recent data has demonstrated decreased LAIV efficacy against the pH1N1 virus.

Objective: This study sought to determine whether past exposure to LAIV or IIV would alter influenza-specific antibody responses following immunization with Fluzone. Knowledge on how previous influenza vaccination affects the development of subsequent influenza-specific immunity is of relevance to universal influenza vaccine design, and there has been recent debate on the efficacy and use of LAIV in children.

Methods: Subjects 14 weeks to 8 years of age provided consent and were enrolled in a 2-year longitudinal study of influenza vaccination. Subjects were divided into two cohorts of seven subjects each on the basis of whether they had received LAIV in the past. Plasma samples were analyzed by ELISA assay and relative antibody titers against the pH1, H3, and NP proteins were measured. Statistical significance was calculated via 2way ANOVAs for each protein between the two cohorts, and via two-tailed t-tests of Delta (D24 – D0) for all subjects for each protein.

Results: All subjects mounted antibody responses to pH1, H3, and NP proteins following Fluzone administration, with boosting of the response post-vaccination in study year 2. A trend towards greater antibody responses in subjects without a history of receiving past LAIV was observed across all proteins. Subjects without past LAIV administration also demonstrated a trend towards greater boosting in study year 2.

Conclusion: Subjects produced similar antibody responses against the pH1, H3, and NP proteins regardless of whether they received LAIV in the past. Despite previous data suggesting that LAIV was a more effective influenza vaccine in children (Belshe 2007), LAIV did not offer an advantage in the priming of B cells against either HA or the internal NP protein. This could be the result of preexisting neutralizing antibody binding LAIV and preventing viral replication, resulting in decreased vaccine efficacy. Future studies to examine whether pre-existing neutralizing antibody decreases the efficacy of LAIV are needed.

References:

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3. Ambrose, C.S., et al. 2001. The relative efficacy of trivalent live attenuated and inactivated influenza vaccines in children and adults. *Influenza and Other Respiratory Viruses* 5(2); 67-75.