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Measles, mumps, and rubella antibody patterns of persistence and rate of decline following the second dose of the MMR vaccine.

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Abstract

BACKGROUND:

Antibodies to measles, mumps, and rubella decline 3% per year on average, and have a high degree of individual variation. Yet, individual variations and differences across antigens are not well understood. To better understand potential implications on individual and population susceptibility, we reanalyzed longitudinal data to identify patterns of seropositivity and persistence.

METHODS:

Children vaccinated with the second dose of measles, mumps, rubella vaccine (MMR2) at 4-6 years of age were followed up to 12 years post-vaccination. The rates of antibody decline were assessed using regression models, accounting for differences between and within subjects.

RESULTS:

Most of the 302 participants were seropositive throughout follow-up (96% measles, 88% mumps, 79% rubella). The rate of antibody decline was associated with MMR2 response and baseline titer for measles and age at first dose of MMR (MMR1) for rubella. No demographic or clinical factors were associated with mumps rate of decline. One month post-MMR2, geometric mean titer (GMT) to measles was high (3892 mIU/mL), but declined on average 9.7% per year among those with the same baseline titer and <2-fold increase post-MMR2. Subjects with ≥ 2 -fold experienced a slower decline ($\leq 7.4\%$). GMT to rubella was 149 one month post-MMR2, declining 2.6% and 5.9% per year among those who received MMR1 at 12-15 months and >15 months, respectively. GMT to mumps one month post-MMR2 was 151, declining 9.2% per year. Only 14% of subjects had the same persistence trends for all antigens.

CONCLUSIONS:

The rate of antibody decay varied substantially among individuals and the 3 antigen groups. A fast rate of decline coupled with high variation was observed for mumps, yet no predictors were identified. Future research should focus on better understanding waning titers to mumps and its impacts on community protection and individual susceptibility, in light of recent outbreaks in vaccinated populations.

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KEYWORDS:

Antibodies; MMR vaccine; Measles; Mumps; Rubella; Waning immunity

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