

**Infection of human B lymphocytes with MMR vaccine induces
IgE class switching.
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Farhad Imani and Kelly E Kehoe
Division of Clinical Immunology, Department of Medicine, The Johns Hopkins
University School of Medicine, Asthma and Allergy Center

FROM INCLUDED ABSTRACT:

Circulating immunoglobulin E (IgE) is one of the characteristics of human allergic diseases including allergic asthma.

We recently showed that infection of human B cells with rhinovirus or measles virus could lead to the initial steps of IgE class switching.

Since many viral vaccines are live viruses, we speculated that live virus vaccines may also induce IgE class switching in human B cells.

To examine this possibility, we selected the commonly used live attenuated measles mumps rubella (MMR) vaccine.

Here, we show that infection of a human IgM B cell line with MMR resulted in the expression of germline epsilon transcript. In addition, infection of freshly prepared human PBLs with this vaccine resulted in the expression of mature IgE mRNA transcript.

Our data suggest that a potential side effect of vaccination with live attenuated viruses may be an increase in the expression of IgE. **[WOW!]**

THESE AUTHORS ALSO NOTE:

"A key component in allergic reactions is increased levels of circulating immunoglobulin E (IgE)."

Mature resting B lymphocytes express IgM.

However, these B lymphocytes can differentiate to "switch" from immunoglobulin class IgM to secreting immunoglobulins IgG, IgA, or IgE.

If the switch is to IgE, IgE molecules will bind to surface receptors of mast cells and basophils, causing the release of histamine and leukotrienes.

Histamine and leukotrienes are responsible for many of the clinical manifestations of the allergic response.

"The incidence rate of allergic reactions such as asthma has increased in the past 20 years." Proposed reasons for this increase include:

- (1) Improvements in home construction leading to an increase in the indoor humidity and temperature resulting in an increase in house dust mite and cockroach allergens.
- (2) Bacterial products [endotoxins] are thought to down-regulate allergic differentiation. Therefore, "an increase in antibiotic usage and a subsequent reduction in bacterial infections has created an environment that may favor allergic conditions."
- (3) A decrease in childhood outdoor activities and an increase in sedentary life styles may contribute to the increase in asthma.
- (4) Viral infections can cause IgE class switching in human B cells.

Specifically, live attenuated viral vaccines such as polio, MMR (mumps, measles, rubella), and varicella can induce IgE class switching.

In this article, the authors provide evidence that infection with MMR vaccine can cause IgE class switching in human B cells. **[WOW!]**

Since MMR vaccine is commonly used during childhood immunization, the authors selected MMR vaccine for their experiments.

The authors showed that MMR vaccine infection induces IgE class switching in freshly prepared human peripheral blood lymphocytes.

DISCUSSION

"Epidemiological studies have shown that one of the key characteristics of allergic diseases is an increase in circulating IgE levels."

"It is well documented that viral infections lead to the induction of IgG expression."

However, viral infections with rubella virus have been associated with the expression of IgE.

"Childhood vaccines such as MMR that are live attenuated viruses could also induce IgE class switching."

"The viral vaccine titer that was used in these experiments was 10 times less than the amount used in childhood immunization."

The “data suggest that attenuated virus vaccine strains can replicate in the immunized host and thus may have the opportunity to interact with B lymphocytes.”

“Infection with measles virus is known to induce a robust Th1 immune response,” which down-regulate [reduce] IgE class switching.

Therefore, infection of B cells with measles virus alone did not induce IgE class switching.

The rubella vaccine was consistently the most potent inducer of IgE class switching.

“Our data showed that live virus MMR vaccine can induce IgE class switching in human B cells.”

“This is particularly relevant because events during the first 3 years of life have been shown to be important in the induction of lifelong allergic reactions.”

Also, “the genetic background of each individual is critical to the expression of allergen-specific IgE protein and subsequently to the induction of allergic reactions.”

“Even though contradictory data exist, there is increasing evidence for induction of atopic reactions secondary to childhood viral immunizations.”

“It is possible that a side effect of viral vaccination constitutes an increase in the incidence of IgE-mediated disorders.”

KEY POINTS FROM DAN MURPHY

- (1) IgE is the primary cause of the clinical manifestations of the allergic response, including asthma.
- (2) Bacterial infections and endotoxin bacterial byproducts reduce IgE, and therefore antibiotics are part of the problem of increasing allergic response.
- (3) Measles infections reduces IgE.
- (4) Mumps and Rubella, especially rubella infection increase IgE. Vaccination with live attenuated mumps and rubella virus also increase IgE, and the allergic response.
- (5) The causes of IgE “switching” in first 3 years of life are most important because the propensity to then produce IgE and allergic reactions is lifelong.