



## Battle of the Experts

### Student Handout #3: **Vaccines and Autism**

By Paul A. Offit, MD

Recently, stories carried by the media have caused some parents to fear that the combination measles-mumps-rubella vaccine (MMR) causes autism. This article provides a summary of the studies used to support the hypothesis that MMR causes autism, the studies that refute this hypothesis, and other investigations into the causes of autism.

#### **The “Wakefield” Studies: Studies Hypothesizing That MMR Causes Autism**

Two studies have been cited by those claiming that the MMR vaccine causes autism. This section summarizes those studies and lists their critical flaws.

##### **The first Wakefield paper**

In 1998, Andrew Wakefield and colleagues published a paper in *The Lancet* titled “Ileal-lymphoid-nodular hyperplasia, non-specific colitis, and pervasive developmental disorder in children.” Wakefield’s hypothesis was that the MMR vaccine causes a series of events that include intestinal inflammation...and consequent development of autism. In support of his hypothesis, Dr. Wakefield described 12 children with neurodevelopmental delay (8 with autism). All of these children had gastrointestinal complaints and developed autism within 1 month of receiving MMR.

##### **Critical flaws**

- About 90% of children in England received MMR at the time this paper was written. Because MMR is administered at a time when many children are diagnosed with autism, it would be expected that most children with autism would have received an MMR vaccine, and that many would have received the vaccine recently. The observation that some children with autism recently received MMR is, therefore, expected. However, determination of whether MMR causes autism is best made by studying the incidence of autism in *both* vaccinated and unvaccinated children. This wasn’t done.
- Although the authors claim that autism is a consequence of gastrointestinal inflammation, gastrointestinal symptoms were observed *after*, not before, symptoms of autism in all eight cases.

##### **The second Wakefield paper**

In 2002, Wakefield and coworkers published a second paper examining the relationship between measles virus and autism...The authors tested intestinal biopsy samples for the presence of measles virus genome from children with and without autism. Seventy-five of 90 children with autism were found to have measles virus genome in intestinal biopsy tissue as compared with only 5 of 70 control patients. On its surface, this was a concerning result. However, this paper was also critically flawed.

### **Critical flaws...**

- Because natural measles virus is still circulating in England, it would have been important to determine whether the measles virus genome detected in these samples was natural measles virus or vaccine virus. Although primers are available to distinguish these two types of virus, the authors chose not to use them.
- RT-PCR [the method used for collecting samples] is a very sensitive assay. Laboratories that work with natural measles virus (such as the lab where these studies were performed) are at high risk of getting false positive results. No mention is made in the paper as to how this problem was avoided.
- As is true for all laboratory studies, the person who is performing the test should not know whether the sample is obtained from a case or a control (blinding). Because no statement is made in the method section, it is unclear that blinding of samples occurred.

### **Studies Showing That MMR Vaccine Does Not Cause Autism**

Five major studies have been performed to refute a causal association between receipt of MMR and autism.

1. The first Taylor paper
2. The JAMA (Journal of the American Medical Association) Paper
3. The British Medical Journal Paper
4. The second Taylor paper
5. The Madsen paper

### **Studies On The Causes of Autism**

Studies have focused on the genetics of autism and the timing of the first symptoms of autism.

#### **Genetics of autism**

One of the best ways to determine whether a particular disease or syndrome is genetic is to examine the incidence in identical...and fraternal...twins. Using a strict definition of autism, when one twin has autism, 60% of identical and 0% of fraternal twins have autism. Using a broader definition of autism (i.e., autistic spectrum disorder), when one twin has autism, approximately 92% of identical and 10% of fraternal twins have autism.

Therefore, autism clearly has a genetic basis.

### **Summing Up**

Studies of 1) the genetics of autism, 2) the timing of the first symptoms of autism (home-movie studies), [and] 3) the relationship between autism and the receipt of the MMR vaccine...all support the fact that autism occurs during development of the central nervous system early in utero [before birth].

Unfortunately, for current and future parents of children with autism, the controversy surrounding vaccines has diverted attention and resources away from a number of promising leads.

Source: Immunization Action Coalition

<http://www.immunize.org/catg.d/p2065.pdf>

### **About the author:**

Dr. Offit is the Chief of Infectious Diseases, the Director of the Vaccine Education Center, and the Henle Professor of Immunologic and Infectious Diseases at the Children's Hospital of Philadelphia. In addition, Dr. Offit is a Professor of Pediatrics at the University of Pennsylvania School of Medicine. Dr. Offit has published over 130 papers in medical and scientific journals in the areas of virology and immunology and was recently a member of the Advisory Committee on Immunization Practices to the Centers for Disease Control and Prevention. He is also the co-author of two books, *Vaccines: What Every Parent Should Know* and *Breaking the Antibiotic Habit: A Parent's Guide to Coughs, Colds, Ear Infections, and Sore Throats*, and the author of *The Cutter Incident: How America's First Polio Vaccine Led to the Growing Vaccine Crisis*.