A Current Look at the MMR and Autism Crisis

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Abstract

There has been a tremendous amount of controversy between parents, autism advocacy groups, various governments and medical science about the measles, mumps, rubella (MMR) vaccine and whether or not it contributes to autism. Media coverage of a hypothesis that was published in the late 1990's suggested that autism may be a direct result of the MMR vaccination. Because little is known about the actual causes of autism, medical science has conducted several investigations that have successfully proven that the MMR vaccination does not cause autism. However, the unfortunate consequence of this dilemma is an overall decrease in much needed vaccinations. This situation not only places children at risk for three potentially deadly diseases, but it could also bring about a possible worldwide epidemic that could affect millions of people, leading to hospitalization and death.

In recent years, there has been a tremendous amount of controversy regarding whether or not children develop autism as a result of the measles, mumps, rubella (MMR) vaccine. Speculation also suggests that the vaccination leads to a greater number of diagnosed cases of autism. According to author Karen Honey (2008), who writes for the *Journal of Clinical Investigation*, many parents and autism advocacy groups continue to blame the vaccine, in spite of extensive scientific research that has provided a tremendous amount of evidence showing no link between the incidence of autism and the MMR vaccine.

Media coverage of a hypothesis that was published in the late 1990's has only added fuel to an already heated debate. Because little is known about the actual causes of autism, medical science has conducted several studies that have clearly proven that the MMR vaccine does not cause autism, but these scientific truths are still contrary to the stout beliefs and concerns of many parents. The MMR vaccine does not cause autism, and the decrease in unvaccinated children has led to an increase in measles, mumps, and rubella worldwide. The fact that the MMR vaccination does not cause autism has not affected the decline of vaccinations over the last two decades.

The positive result of the MMR and autism debate is the increase of long-overdue and much-needed funding for research regarding the causes of autism. The unfortunate consequence of this dilemma, however, is a decrease in necessary vaccinations, and lower vaccination rates contribute to an increase in these preventable diseases. This situation not only places children at risk for three potentially deadly diseases but could also bring about a possible worldwide epidemic that would affect millions of people, leading to hospitalization and death.

Edward Purssell (2004), author of *Exploring the Evidence Surrounding the Debate on MMR and Autism*, believes that the MMR and autism crisis initially began with a hypothesis paper that was published in *The Lancet* in the fall of 1998. Since that time, quite a few parents have claimed that shortly after receipt of the MMR vaccination, their child developed autistic symptoms. Medical statistics show that diagnosed cases of the disease have truly been on the increase over the last several decades (Purssell, 2004).

This is possibly due in part to media coverage of the hypothesis–henceforth known as the Wakefield hypothesis–that has created a worldwide scare of children being diagnosed with autism shortly after vaccination. Some families dated the onset of their child's neurological deterioration to occur within two weeks of the administration of the MMR vaccine (Meissner, Orenstein and Strebel, 2004).

The Wakefield hypothesis paper was written by Andrew Wakefield and his colleagues in the fall of 1998 and was based on the cases of twelve children who already had a previous history of pervasive developmental disorders and whose parents had already assumed a link between the MMR vaccine and their child's symptoms of autism (Purssell, 2004). However, Wakefield and his colleagues eventually concluded that they "did not prove an association between measles, mumps, and rubella vaccine and the syndrome described" (Purssell, 2004, p.834). In spite of this statement, the media picked up the story and chose to exploit the suggestion that these children's autistic symptoms were a direct result of the

MMR vaccination. This exaggerated media coverage alarmed parents all over the world about the safety of vaccinations.

Autism is a developmental disability included in a group of neurological disorders known as autism spectrum disorders (ASDs). Autism is a serious neurodevelopmental disorder that can cause impairments and difficulties with nonverbal and verbal communication, social interaction, the ability to pay attention, repetitive behaviors, and different physical reactions to certain sensations (Croen et al., 2006). People with autism may have intense internal struggles with cognitive processes that can range from being cognitively gifted to severely challenged. The symptoms of autism generally begin to appear physically prior to three years of age and continue for the duration of an individual's lifetime. According to Croen et al., (2006) "males are four times more likely to have autism than females," and the majority of people with autism are unable to live independently as adults.

Since the publication of the Wakefield hypothesis, many cases of autism have been diagnosed during a developmental time period when children are being vaccinated against measles, and this time period parallels the time when certain children may also be showing symptoms of autism (Meissner et al., 2004). Children generally begin to show clearly-recognizable signs of autism–such as loss of language skills–generally between one and two years of age, and this time period coincides with the MMR vaccine **(**Taylor, 2006). Rather than consider this overlap as two separate events, many hypothesize that the vaccine is to blame.

Children with autism generally manifest abnormal development from birth, but about 20% to 30% may experience regression and do not show symptoms of the disease until between eighteen and twenty-four months of age. These children are typically documented as having normal development up until that point (Croen, Hertz-Picciotto, Jones, Pessah and Van de Water, 2006). This may explain why certain children seem to develop autism shortly after they are given the MMR vaccine; it may be simply coincidental.

In February of 2008, the United States government recently agreed financially to compensate the family of a child who was nine years of age for possible autism-related injuries that were caused by vaccinations (Honey, 2008). The Center for Disease Control (CDC) paid the family of the child from a federal fund called The National Vaccine Injury Compensation Program, or NVICP, that compensates the families of people who are injured as a result of vaccines.

In response to the decision to pay the family, the president of the National Autism Association, Wendy Fournier, stated "Vaccines can and do cause children to regress into autism" (Honey, 2008 p.1586). Statements of this type from public officials like Wendy Fournier have the potential to create very strong convictions about issues such as vaccination safety among the public and can have an enormous impact on the health and safety of entire societies if they are not wholly based on fact.

When discussing this particular judgment, the director of the U.S. Center for Disease Control and Prevention (CDC), Julie Gerberding, stated, "This does not represent anything other than a very special situation" (Honey, 2008, p.1586). The judgment to pay this family

has created a stronger foundation for the argument against vaccine safety and has added strength to the controversy that certain vaccinations can and do cause autism. An important fact about this case that was not well publicized was that in this particular situation, the child was already showing signs of autism, but the parents stated that the symptoms were severely worsened by receiving vaccinations (Honey, 2008).

Children in today's society are routinely vaccinated against fourteen different diseases during their infancy and preschool years. The reason that vaccines are administered at such a young age stems from the fact that protection from these diseases needs to precede exposure to the diseases themselves (Miller and Reynolds, 2009). Beginning in 1963, the U.S. began the vaccination program against measles virus, and it has been an important part of childhood immunizations since that time. Most children, approximately 95%, will develop immunity to the disease (Meissner et al., 2004). According to Miller and Reynolds (2009), in the USA and UK, the occurrences of autism have increased, and the MMR vaccine has been implicated as the cause because the increase was noted after the release of the MMR vaccination.

While there is very likely a genetic component to autism, it does not account for every case of the disease or the noticeable increase in the number of diagnosed children over the past few years. A study that was conducted in California suggests that between 1987 and 1998, the diagnosed cases of autism rose approximately 273% and between 1998 and 2002, the cases rose another 97% (Purssell, 2004).

A possible factor for the increase is the ability of the immune system to be able to respond to certain vaccines (Purssell, 2004). Some scientists speculate that the immune system of a child has difficulty processing more than a single virus at one time. The MMR vaccine has three (Purssell, 2004).

Since the Wakefield et al., paper was published, numerous scientific studies have taken place to address the possibility of any link between the vaccine and neurological disorders, like autism. Many highly respected organizations in the medical and scientific communities have come to disagree with the Wakefield hypothesis. According to *The American Academy of Pediatrics and the Institute of Medicine,* "The evidence favors rejection of a causal relationship . . . the available evidence does not support the 'Wakefield' hypothesis that MMR vaccine causes autism or associated disorders" (Meissner, et al., p.1068). It should also be noted that since the paper's original publication, most of Wakefield's colleagues who had assisted in the research and creation of the hypothesis have retracted their initial statements and findings (Purssell, 2004).

The actual cause of autism is unknown, but scientific evidence speculates toward a combination of possible factors. The major proposed categories that are suspected to be contributing factors are genetics and certain environmental components before and after the child is born. (Parker, Schwartz, Todd and Pickering, 2004). These environmental factors fall into five classes of exposure: metals, toxic pollutants, prenatal infections, medications and pesticides (Croen et al., 2006). Croen and his colleagues claim that prenatal exposure to thalidomide may also be a possible contributing factor that has been associated with specific

autistic behaviors. Although a few studies have shown a possible correlation between xenobiotic chemicals, autism, and/or viruses, Croen et al., (2006) states that no true and solid, "methodologically rigorous investigations . . . have been undertaken" (p. 1119).

Several case-controlled and clinic-based studies have shown that if a family has a history of certain language abnormalities, social deficits and varying psychiatric disorders, they may have a higher chance of autistic symptoms in their children. There have also been several cases of autism reported after the mother was diagnosed with infections during pregnancy. Prenatal cases of measles, mumps, herpes, syphilis, and cytomegalovirus have also been associated with autism in the child. Other reports and records show that the relative risks of the mother smoking cigarettes daily during early pregnancy could also contribute to autism (Croen et al., 2006).

The link between genetics and autism has been suggested as another possible cause when viewing whether or not a family has a history of twins or siblings with autism. Croen et al. (2006) states that the probability of developing autism if a person's sibling is autistic has been estimated at 2% to 14%. Studies that have been conducted on twins suggest a "strong genetic contribution to the etiology of autism" (p, 1120). Meissner et al., author of *Measles Vaccines and the Potential for Worldwide Eradication of Measles,* states, "the weight of scientific evidence suggests that ASD is a consequence of a complex genetic mechanism that seems to affect brain growth and development in utero and in the first year of life" (p. 1068). Meissner et al., also explains that the increasing prevalence of autism that has been reported may be a result of a change in the way autism is diagnosed and the criteria that are related to diagnosis, which has been greatly improved in recent years.

Genetic components combined with environmental factors–including vaccinations–during a child's development make it very challenging for medical science to pinpoint the true cause of autism. Each individual case of autism is unique, which makes the disorder particularly challenging to understand fully from a medical and scientific standpoint.

Croen and his colleagues explain that the prevalence of autism has increased because of improved diagnostic practices–"changes in case definitions and changes in reimbursement for medical services" (p. 1120). In the pre-vaccine era, very early reports had estimated that the prevalence of autism was at four to five per 10,000 births. Croen et al., also shares that recent statistics, which state that "autistic disorder occurs in at least [one] to [two] per 1000 births[,] and autism spectrum disorder may be as high as [four] to [six] per 1000 " (p. 1121).

Another controversial issue in the MMR and autism debate is a component that is used as a preservative in the vaccine called Thimerosal. It has been suggested that vaccines that contain Thimerosal may also be a contributing factor to autism. Thimerosal is a preservative that was previously used in the MMR vaccine. It is 49.6 % ethyl mercury by weight. The purpose of Thimerosal is to prevent bacterial contamination in vaccinations that contain more than one dose of different viruses (Parker, Schwartz, Todd and Pickering, 2004).

In a peer-reviewed article entitled "Thimerosal-Containing Vaccines and Autistic Spectrum Disorder: A Critical Review of Published Original Data," Parker and her colleagues review "[ten] epidemiologic studies and [two] pharmacokinetic studies" to "assess

the quality of evidence assessing a potential association between thimerosal-containing vaccines and autism and evaluate whether that evidence suggests accepting or rejecting the hypothesis" (p. 791). The result was that the studies, "did not demonstrate any link between ASD and Thimerosal-containing vaccines[,] and the pharmacokinetics of ethyl-mercury make such an association less likely" (Parker et al., 2004 p. 794). It is interesting to note that even though the United States has discontinued the use of Thimerosal in the MMR vaccine, the diagnosed cases of autism still continue to increase.

Although the Wakefield hypothesis has been seriously undermind, many parents still continue to refuse the administration of necessary immunizations to their children. The media fervor has resulted in measles immunization programs suffering a major setback as a result of the alleged association between the MMR vaccine and autism.

In a study conducted by Cook, et al., (2004), these highly qualified medical researchers looked at the possibility of an association between receipt of the MMR vaccination and an increase in the risk of autism. The results of their case study were published in an article entitled "MMR Vaccination and Pervasive Developmental Disorders: A Case-Control Study." This study used "the method of a matched case-controlled study using the United Kingdom's General Practice Research Database" (p. 963). The study included 1294 cases and 4469 controls that "were matched by age, sex and general practice" (p. 963).

According to this study, 1010 cases (78.1%) were diagnosed with autism prior to the MMR vaccination which is "compared with 3671 (82.1%) prior to the age at which their matched case was diagnosed" (p. 963). The results of this study were not much different when the controls were isolated to children with autism and to those who were vaccinated before the child turned three years of age. As the article states

> MMR vaccination was not associated with an increased risk of subsequently being diagnosed with a PDD. The findings were similar when analysis was restricted to children classified as having autism, or to children who had MMR vaccination before age [three] years (p. 966).

Cook and his colleagues finally concluded that:

> We have found no convincing evidence that MMR vaccination increases the risk of autism or other PDDs. No significant association has been found in rigorous studies in a range of different settings. These are severe diseases for which very little is known about causation; this absence of knowledge itself might have contributed to the misplaced emphasis on MMR as a cause. Research into the real origins of autism is urgently needed (p.968).

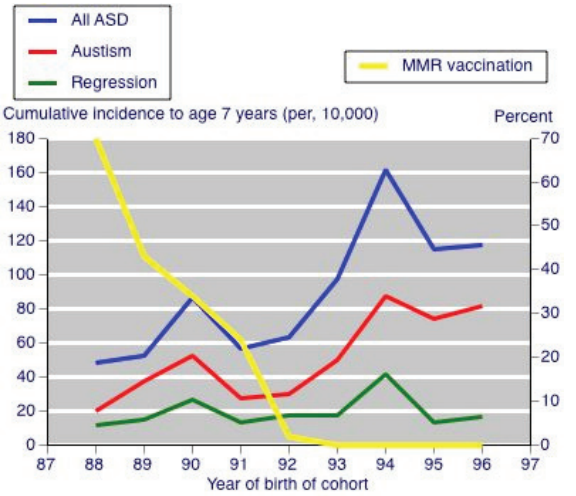
Shortly after the MMR vaccine program was introduced in Japan in April of 1989, an outbreak of aseptic meningitis occurred. Aseptic meningitis is considered to be a possible side effect of MMR vaccination. Because of this possible connection, the administration of all MMR vaccines was brought to an abrupt halt four years later (Uchiyama**,** Kurosawa

and Inaba, 2007). This unique situation provided an opportune chance for scientists and the medical community to conduct extensive studies and observations regarding the children that would be diagnosed with autism during the ensuing non-vaccine era.

In Japan, the MMR vaccine program was used from 1989 to 1993. A study of 904 patients with ASD was conducted by Yokohama Rehabilitation Center in Yokohama, Japan and the Institute of Psychiatry in London. This study measured the incidence of autism "before and after the termination of the MMR vaccination program" (Honda, Rutter and Shimizu, 2005, p. 573).

This study focused on the occurrence of ASD to children up to the age of seven in the city of Yokohama, which has a population of approximately 300,000. The MMR vaccination was not administered after 1993, yet the study's findings clearly show that even though no children received the MMR vaccination, the diagnosed cases of autism continued steadily to increase.

The study found that "no decline in ASD incidence occurred in the five-year period from 1988 to 1992 during which MMR vaccine usage fell from 69.8% to zero population coverage" (Honda et al., 2005, p. 575). As is shown in the following graph, the incidence of ASD continued to increase after the vaccination program was discontinued:

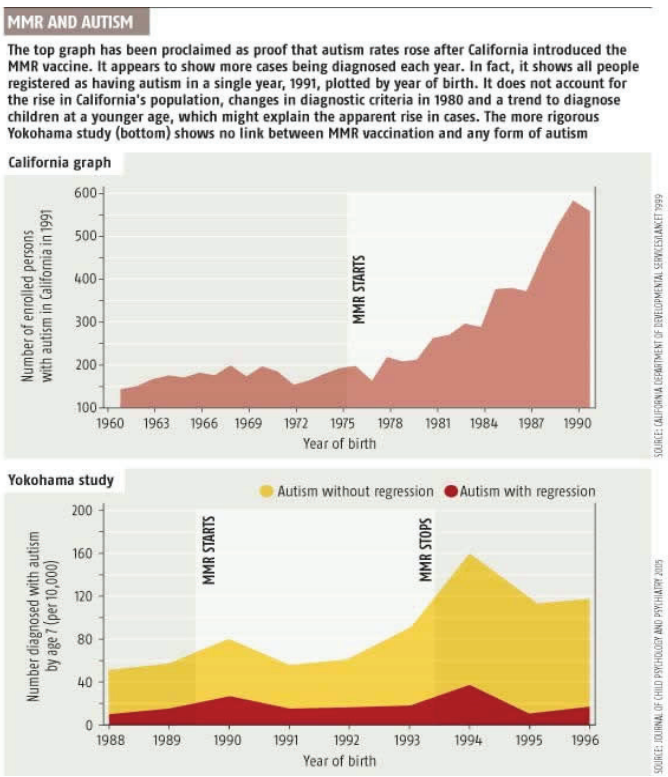


(http://www.medicine.ox.ac.uk/bandolier/booth/Vaccines/noMMR.html).

If the MMR vaccine had been responsible for an increase in autism, there should have been a decrease in diagnosed cases of autism following Japan's removal of the administration of the MMR vaccine. This study was very helpful in showing the effects of the withdrawal of the vaccine from an entire population with regard to the incidence of autism cases. The MMR vaccine cannot be attributed to the many children in Japan who were diagnosed with autism who "were born and grew up in the era when MMR was not available" (Honda et al., 2005 p. 578).

It is important to note that the frequency of children diagnosed with autism during this period was comparable to the frequency of other nations where children diagnosed with autism received the MMR vaccination. According to the study, "This frequency is at least as high as populations of other countries in which most children were vaccinated; it implies that MMR could not cause a substantial proportion of cases of autism" (Honda et al., 2005 p. 576). This study proves that failure to provide important vaccinations to children will not result in lower diagnosed cases of autism.

If the MMR vaccine is responsible for autism spectrum disorders, then it stands to reason that the number of cases of autism would be significantly higher in societies where children are receiving the vaccine. In Yokohama, Japan, the cases of autism would have been expected to increase after the vaccination program was introduced and decrease after the program was ended, but that was clearly not the case. As Uchiyama (2007) states, "If the MMR vaccination is related to 'regressive autism,' regression in the development of children with autism should be more common in the MMR generation than in the pre- and post-MMR generations" (p. 215). The following graph from Coghlan (2005) depicts diagnosed cases of autism in California and Yokohama in relation to the vaccine:



It is helpful to note that the Japanese MMR immunization program was terminated prior to the time period when the Wakefield Hypothesis was made public and exploited by the media worldwide. The Yokohama study concluded that, "The MMR vaccination is most

unlikely to be a main cause of ASD, that it cannot explain the rise over time in the incidence of ASD, and that withdrawal of MMR in countries where it is still being used cannot be expected to lead to a reduction in the incidence of ASD" (Honda, et al., 2005 p. 577).

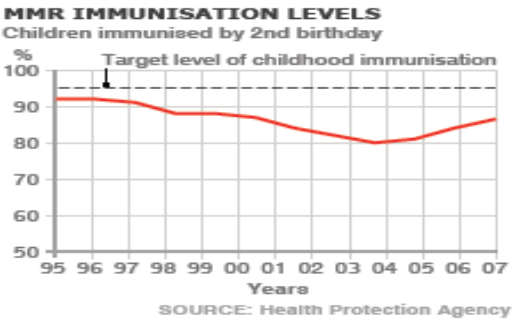
What can be learned from the Japanese study is that the removal of MMR cannot be expected to reduce the cases of autism. Simply terminating the MMR vaccine will not lead to a decrease in autism or other pervasive developmental disorders, but it could unfortunately lead to a serious outbreak of measles, mumps, or rubella. An outbreak could lead to a worldwide epidemic, and an epidemic is obviously far more serious and life threatening to multitudes of human lives.

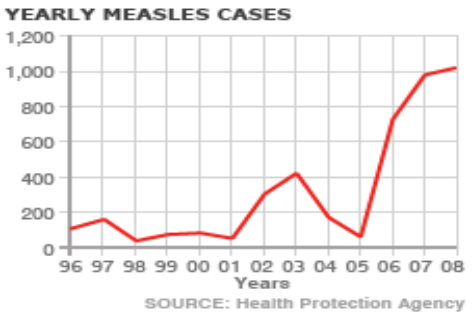
In the time before measles vaccination, the US reported three to four million measles cases each year, resulting in thousands of deaths (Meissner et al., 2004). Since the MMR vaccination program was introduced in 1963, the number of measles cases has dropped 98%. Measles infection accounts for almost half of the 1.6 million fatalities that are a result of diseases that could be prevented by proper vaccinations. It is estimated that approximately thirty-one million cases of the measles virus are contracted each year in third world countries (Meissner et al., 2004). In 2001, the World Health Organization reported 745,000 fatalities that occurred in children younger than fifteen years old (Meissner et al., 2004). This was tragically a direct result of low measles vaccination rates.

Meissner and his colleagues (2004) state that:

> On a global basis, 98% of all deaths as a result of complications of measles occur in countries where malnutrition, especially vitamin A deficiency, is common. . . .The effectiveness of a comprehensive measles immunization program on disease elimination is so profound that it is appropriate to consider the possibility of global measles eradication and how obstacles to that objective might be overcome (p. 1067).

In the US, certain states allow parents the option of becoming immunization exemptors. This means that the individual has the right to choose not to become immunized based on medical, religious, or philosophical grounds. This is believed to cause an increased risk to children who do not receive proper and timely immunizations. According to Meissner et al. (2004) "Among unvaccinated school-aged children (three to ten years of age), the risk of measles was sixty-two times greater than among properly vaccinated students" (p. 1167). The following graphs show a strong correlation between MMR immunization levels and diagnosed cases of measles. It clearly shows a decrease in the percentage of children being vaccinated and an increase in measles cases after the release of the Wakefield Hypothesis:





As the number of parents who choose to keep their children unvaccinated increases, the possibility of others in a community contracting the measles virus also increases due to a greater possibility of exposure to the virus. The decision not to receive proper vaccinations from contagious diseases can have an impact on other people in the community as well. Lack of an individual's vaccination can place many other people at a very serious risk, particularly people who may be more vulnerable, such as infants, the elderly and immuno-compromised individuals (Meissner et al., 2004).

Not only is abstaining from vaccinations an important issue, but the effectiveness of the vaccine itself is a topic of concern. While the number of reported cases of measles, mumps, and rubella has been greatly reduced, the effectiveness of the vaccine is still in question. According to the CDC, "Measles transmission has been clearly documented among vaccinated persons. In some large outbreaks . . . over 95 percent of cases have a history of vaccination" (Honey, 2008 p.1586). This basically means that just because individuals are vaccinated, does not necessarily mean that they will not contract the disease.

The MMR vaccine does not necessarily offer a permanent immunity, and measles outbreaks somtimes still continue to occur in vaccinated populations (Cook, 2004). Due to a resurgence of measles outbreaks among children that had previously been vaccinated, the American Academy of Pediatrics and the Advisory Committee on Immunization Practices began recommending two doses of the MMR vaccine instead of just one. It is for this reason that it is recommended that children receive their first MMR vaccination at one year of age and the second vaccination at four years of age. In the United Kingdom, it is

estimated that about two in four children have not received their second MMR vaccination (Meissner, et al., 2004).

It is critical to realize that vaccines are intended to prevent diseases–not to treat them. In the United Kingdom, it is important to note the proportional parallel between the lower number of children that have received the MMR vaccination and the greater number of diagnosed measles cases. The amount of measles cases increased from fifty-six cases in 1998 to 971 cases in 2007 (Honey, 2008). In a recent measles outbreak in California, nine out of the twelve children that had contracted the measles virus had not received their childhood vaccination against the disease, and the three other children were not yet old enough to receive their vaccination (Honey, 2008).

It has been well documented that public concerns regarding the safety of vaccinations may result in fewer people receiving vaccination. Lower vaccination rates would ultimately lead to disease outbreaks, and money that could be spent on important autism research would be spent healing nations of preventable diseases. While many countries allow individuals to choose whether or not to immunize their children against contagious diseases, if the unvaccinated children contracts the disease, it may spread to others that do not have immunity, resulting in a possible epidemic.

When individuals choose to remain unvaccinated against highly contagious and life-threatening diseases, they inevitably jeopardize entire populations and waste valuable resources that could be used in a more productive manner, such as neurological disorder research. The US currently spends approximately forty-five million dollars each year for the MMR vaccine. It is "estimated that 1.5 billion is spent annually on treatment and prevention of measles worldwide" (Meissner et al., 2004, p. 1068).

There is always an element of risk involved when taking any type of medication or vaccination, and there is also a risk attached to the decision not to vaccinate against diseases. The Wakefield hypothesis that originally suggested the possible link between the MMR vaccine and autism is theoretically possible but is based on weak evidence. It is true that autism is on the rise, but there is no scientifically proven and absolute explanation for this increase.

The MMR vaccine is a vital part of controlling diseases that cause a considerable amount of hospitalization and death and should be taken very seriously when considering the outcome of having a child vaccinated or allowing them to remain non-vaccinated and vulnerable. Wakefield's hypothesis seems to have been counterproductive, but in reality, it has actually created a much-needed and long overdue opportunity for better funding and research for vaccinations and neurological disorders, such as autism. Parents can be assured by strong, scientific evidence that there is very little reliable information to support any connection between the MMR vaccine and autism, and refraining from vaccination may lead to a large measles outbreak and the easily avoidable and untimely tragic deaths of millions.

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