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# Measles: Questions and Answers

## *Information about the disease and vaccines*

### **What causes measles?**

Measles is caused by a virus.

### **How does measles spread?**

Measles is spread through the air by infectious droplets and is highly contagious.

### **How long does it take to show signs of measles after being exposed?**

It takes an average of 10–12 days from exposure to the first symptom, which is usually fever. The measles rash doesn't usually appear until approximately 14 days after exposure, 2–3 days after the fever begins.

### **What are the symptoms of measles?**

Symptoms include fever, runny nose, cough, loss of appetite, "pink eye," and a rash. The rash usually lasts 5–6 days and begins at the hairline, moves to the face and upper neck, and proceeds down the body.

### **How serious is measles?**

Measles can be a serious disease, with 30% of reported cases experiencing one or more complications. Death from measles occurred in approximately 2 per 1,000 reported cases in the United States from 1985 through 1992. Complications from measles are more common among very young children (younger than five years of age) and adults (older than 20 years of age).

### **What are possible complications from measles?**

Diarrhea is the most common complication of measles (occurring in 8% of cases), especially in young children. Ear infections occur in 7% of reported cases. Pneumonia, occurring in 6% of reported cases, accounts for 60% of measles-related deaths. Approximately one out of one thousand cases will develop acute encephalitis, an inflammation of the brain. This serious complication can lead to permanent brain damage.

Measles during pregnancy increases the risk of premature labor, miscarriage, and low-birth-weight infants, although birth defects have not been linked to measles exposure.

Measles can be especially severe in persons with compromised immune systems. Measles is more severe in malnourished children, particularly those

with vitamin A deficiency. In developing countries, the case-fatality rate may be as high as 25%.

### **How do I know if my child has measles?**

Measles is diagnosed by a combination of the patient's symptoms and by laboratory tests.

### **Is there a treatment for measles?**

There is no specific treatment for measles. People with measles need bed rest, fluids, and control of fever. Patients with complications may need treatment specific to their problem.

### **How long is a person with measles contagious?**

Measles is highly contagious and can be transmitted from four days before the rash becomes visible to four days after the rash appears.

### **If I think my child has been exposed to measles, what should I do?**

You should contact your doctor immediately if you believe you or your child has been exposed to measles. If your child has not been vaccinated, measles vaccine may prevent disease if given within 72 hours of exposure. Immune globulin (a blood product containing antibodies to the measles virus) may prevent or lessen the severity of measles if given within six days of exposure.

### **How common is measles in the United States?**

Before the vaccine was licensed in 1963, there were an estimated 3–4 million cases each year. In the years following 1963, the number of measles cases dropped dramatically, with only 1,497 cases in 1983, the lowest annual total reported up to that time.

A measles epidemic occurred in the U.S. from large outbreaks in many cities. From 1989 to 1991, 55,622 cases were reported with a total of 123 measles-associated deaths. Half of the cases and deaths were in children younger than five years of age. The most important cause of this epidemic was low vaccination rates among preschool-age children.

Due to extensive vaccination efforts, the number of reported measles cases fell during the 1990s. Only 37 cases were reported in 2004. However, new cases continue to be reported, primarily in populations that have refused vaccination for religious or personal belief reasons. From January through July 2008, CDC received reports of 131 measles cases

*Page 1 of 4*

from 15 states and the District of Columbia—the highest year-to-date number since 1996. More than 90% of those infected had not been vaccinated, or their vaccination status was unknown. Many of these individuals were children whose parents chose not to have them vaccinated. Fifteen of the patients, including four infants, were hospitalized.

In addition, measles is still common in many other countries and can be easily imported or contracted when traveling.

#### **Can you get measles more than once?**

No.

#### **When did measles vaccine become available?**

Measles vaccine became available in 1963. An improved measles vaccine became available in 1968. Combination measles-mumps-rubella (MMR) vaccine became available in 1971. Combination measles-mumps-rubella-varicella (MMRV) vaccine became available in 2005.

#### **What kind of vaccine is it?**

Measles vaccine is a live, attenuated (or weakened) strain of the measles virus grown in chick embryo tissue culture. In the United States, it is recommended that it be given as part of the MMR vaccine, which protects against measles, mumps, and rubella (German measles) or the MMRV vaccine (MMR plus varicella [chickenpox] vaccine) when age-appropriate (licensed for use only from age 12 months through age 12 years).

#### **How is this vaccine given?**

This vaccine is a shot given subcutaneously (in the fatty layer of tissue under the skin).

#### **Who should get this vaccine?**

Two doses of measles vaccine (given as combination MMR or MMRV when age-appropriate) are recommended for all children and certain adolescents and adults.

#### **At what age should the first MMR/MMRV shot be given?**

The first dose of MMR or MMRV should be given on or after the first birthday; the recommended range is from 12–15 months. A dose given before 12 months of age may not be counted, so the child's medical appointment should be scheduled with this in mind.

#### **When should children get the second MMR/MMRV shot?**

The second dose is usually given when the child is

4-6 years old, or before he or she enters kindergarten or first grade. However, the second dose can be given anytime as long as it is at least four weeks after the first dose. MMRV can only be given through age 12 years.

#### **How effective is this vaccine?**

The first dose of MMR vaccine produces immunity to measles in 95–98% of children vaccinated. The reason for the second dose is to protect those persons who did not become immune after one dose. After two doses of measles vaccine, 99% of persons become immune to the disease.

#### **Which adolescents and adults should receive the MMR vaccine?**

In general, adults born before 1957 are likely to have had measles, mumps, and rubella during childhood and so are assumed to be immune. Exceptions to this guideline are women who want to become pregnant (see rubella section) and persons who work in medical facilities (see next question).

All persons born in or after 1957 should be immune to measles by having had one or more doses of MMR vaccine, a blood test that indicates immunity to measles, or written documentation of measles disease diagnosed by a doctor. Certain groups of people born in or after 1957 are at increased risk for exposure to measles and must be certain to be immune to measles. These adults are those attending college or other post-high school educational institutions, persons who work in medical facilities, and international travelers. These adults should receive two doses of MMR or have other evidence of measles immunity (lab test or physician-diagnosed measles).

#### **Why do healthcare workers need proof of immunity to measles?**

Persons who work in medical facilities are at much higher risk for being exposed to measles than is the general population (most people with measles are quite ill and will visit a medical facility at some point during their illness). Making sure that all workers are immune to this disease protects both the employee and the patients with whom he or she may have contact. All persons working in a healthcare facility in any capacity should have evidence of immunity to measles, including full- or part-time employees, medical or non-medical, paid or volunteer, students, and those with or without direct patient responsibilities.

Healthcare workers should have documentation of two doses of a measles-containing vaccine (e.g.,

MMR), laboratory evidence of measles immunity, or laboratory confirmation of disease.

#### **Who recommends this vaccine?**

The Centers for Disease Control and Prevention (CDC), the American Academy of Pediatrics (AAP), the American Academy of Family Physicians (AAFP), and the American College of Physicians (ACP) have all recommended this vaccine.

#### **How safe is this vaccine?**

Hundreds of millions of doses of measles vaccine have been given in the United States, and its safety record is excellent. Because it is a live vaccine, side effects following vaccination can be similar to a very mild case of measles. More than 80% of children will have no side effects at all.

#### **What side effects have been reported with this vaccine?**

Fever is the most common side effect, occurring in 5%–15% of vaccine recipients. About 5% of persons develop a mild rash. When they occur, fever and rash appear 7–12 days after vaccination. About 25% of adult women receiving MMR vaccine develop temporary joint pain, although this symptom is related to the rubella component of the combined vaccine. Joint pain only occurs in women who are not immune to rubella at the time of vaccination. MMR vaccine may cause thrombocytopenia (low platelet count) at the rate of about 1 case per 30,000–40,000 vaccinated people. Cases are almost always temporary and benign.

More severe reactions, including allergic reactions, are rare. About one person per million develops inflammation of the brain, which is probably caused by the measles vaccine virus.

#### **If my child develops a rash after getting the MMR vaccine, is he contagious?**

Transmission of the measles vaccine virus does not occur from a vaccinated person, including those who develop a rash. No special precautions (e.g., exclusion from school or work) need be taken.

#### **Who should NOT receive measles vaccine?**

Anyone who experiences a severe allergic reaction (e.g., generalized hives, swelling of the lips, tongue, or throat, difficulty breathing) following the first dose of MMR should not receive a second dose. Anyone knowing they are allergic to an MMR component (gelatin, neomycin) should not receive this vaccine.

As with all live virus vaccines, women known to be pregnant should not receive the MMR vaccine, and pregnancy should be avoided for four weeks following vaccination with MMR. However, women who are breast-feeding can be vaccinated. Children and other household contacts of pregnant women should be vaccinated according to the recommended schedule.

Severely immunocompromised persons should not be given MMR vaccine. This includes persons with conditions such as congenital immunodeficiency, AIDS, leukemia, lymphoma, generalized malignancy, and those receiving treatment for cancer with drugs, radiation, or large doses of corticosteroids. Household contacts of immunocompromised people should be vaccinated according to the recommended schedule.

Although persons with AIDS or HIV infection with signs of serious immunosuppression should not be given MMR, persons with HIV infection without symptoms can and should be vaccinated against measles.

#### **Can individuals with egg allergy receive MMR vaccine?**

In the past it was believed that persons who were allergic to eggs would be at risk of an allergic reaction from the vaccine because the vaccine is grown in tissue from chick embryos. However, recent studies have shown that this is not the case. Therefore, MMR may be given to egg-allergic individuals without prior testing or use of special precautions.

#### **Does the MMR vaccine cause autism?**

There is no scientific evidence that measles, MMR, or any other vaccine causes autism. The question about a possible link between MMR vaccine and autism has been extensively reviewed by independent groups of experts in the U.S. including the National Academy of Sciences' Institute of Medicine. These reviews have concluded that the available epidemiologic evidence does not support a causal link between MMR vaccine and autism.

The MMR-autism theory had its origins in research by Andrew Wakefield and colleagues in England. They suggested that inflammatory bowel disease (IBD) is linked to persistent viral infection. In 1993, Wakefield and colleagues reported isolating measles virus in the intestinal tissue of persons with IBD. The validity of this finding was later called into question when it could not be reproduced by other researchers.

The studies that suggest a cause-and-effect relationship exists between MMR vaccine and autism have received a lot of attention by the media. However, these studies have significant weaknesses and are far outweighed by many population studies that have consistently failed to show a causal relationship between MMR vaccine and autism. In addition, the findings were further discredited when an investigation found that Wakefield did not disclose he was being funded for his research by lawyers seeking evidence to use against vaccine manufacturers.

For a summary of the issues on this topic, please read "Vaccines and Autism," by Paul A. Offit, MD, Director, Vaccine Education Center, Children's Hospital of Philadelphia. This discussion can be accessed online at <http://www.chop.edu/consumer/jsp/division/generic.jsp?id=84662>.

"MMR vaccine does not cause autism. Examine the evidence!" lists all the major studies related to this issue with links to journal article abstracts: <http://www.immunize.org/catg.d/p4026.pdf>

Dr. Ari Brown has written a good piece for parents questioning the safety of vaccines. To access "Clear Answers & Smart Advice About Your Baby's Shots," go to: <http://www.immunize.org/catg.d/p2068.pdf>

For more information, visit CDC's web page about MMR vaccine safety at [http://www.cdc.gov/vaccine-safety/updates/mmr\\_vaccine.htm](http://www.cdc.gov/vaccine-safety/updates/mmr_vaccine.htm)

#### **Can the vaccine cause measles?**

As mentioned above, because the measles vaccine is "live," it can cause mild measles-like symptoms in some recipients, but it does not cause measles disease.