

# 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 from person to person through the air by infectious droplets; it 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 occurs in 2 to 3 per 1,000 reported cases in the United States. Complications from measles are more common among very young children (younger than five years) and adults (older than 20 years).

### 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 fatality rate may be as high as 25%.

### How is measles diagnosed?

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.

### What should be done if someone is exposed to measles?

Notification of the exposure should be communicated to a doctor. If the person 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. By 2004, only 37 cases were reported – a record low. However, new cases continued to be reported, primarily in populations that have refused vaccination for religious or personal belief reasons. From 2001 through 2011, an average of 63 measles cases (range, 37 to 220) and four outbreaks were reported each

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year in the United States. Of the 911 cases, a total of 372 (41%) were imported from outside the U.S. and an additional 432 (47%) were associated with importations. Hospitalization was reported for 225 (25%) cases. Two deaths were reported. Most cases occur among people who declined vaccination because of a religious, or personal objection.

The U.S. experienced a record number of measles cases during 2014, with 644 cases reported from 27 states. This is the greatest number of cases since measles elimination was documented in the U.S. in 2000. In 2015, the U.S. experienced a large, multi-state outbreak of measles linked to an amusement park; for up-to-date case counts and outbreak information, visit CDC's Measles Cases and Outbreaks web page at [www.cdc.gov/measles/cases-outbreaks.html](http://www.cdc.gov/measles/cases-outbreaks.html).

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

No.

### **When did vaccines for measles, mumps, and rubella become available?**

The first measles vaccines (an inactivated and a live virus product) became available in 1963, both of which were largely replaced by a further attenuated live virus vaccine that was licensed in 1968. The mumps vaccine first became available in 1967, followed by the rubella vaccine in 1969. These three vaccines were combined in 1971 to form the measles-mumps-rubella (MMR) vaccine. A vaccine that combines both MMR and varicella (chickenpox) vaccines, known as MMRV, became available in 2005. Single antigen measles, mumps, and rubella vaccines are no longer available in the U.S.

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

MMR vaccine contains live, attenuated (or weakened) strains of the measles, mumps, and rubella viruses.

### **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?**

All children, adolescents, and adults born in 1957 or later without a valid contraindication should have

documentation of vaccination or other evidence of immunity. Additionally, some healthcare personnel who were born before 1957 may also need proof of vaccination or other evidence of immunity.

### **What kind of “evidence of immunity” can substitute for MMR vaccination?**

Evidence of immunity can be shown by having laboratory evidence of immunity to measles, mumps, and/or rubella or laboratory confirmation of disease. However, if a person doesn't have evidence of immunity to all three diseases (e.g., measles, mumps, and rubella), they would still need to get vaccinated with MMR since the vaccine is not available as a single antigen product in the U.S.

### **At what age should the first dose of MMR be given?**

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

### **When should children get the second MMR 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 earlier as long as there has been an interval of at least 28 days since the first dose.

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

The first dose of MMR produces immunity to measles and rubella in 90% to 95% of recipients. The second dose of MMR is intended to produce immunity in those who did not respond to the first dose, but a very small percentage of people may not be protected even after a second dose.

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

All unvaccinated adolescents without a valid contraindication to the vaccine should have documentation of two doses of MMR. All adults born in or after 1957 should also have documentation of vaccination or other evidence of immunity.

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Adults born before 1957 are likely to have had measles and/or mumps disease as a child and are generally (but not always) considered not to need vaccination.

### Which adults need two doses of MMR vaccine?

Certain adults are at higher risk of exposure to measles, mumps, and/or rubella and may need a second dose of MMR unless they have other evidence of immunity; this includes adults who are:

- students in postsecondary educational institutions (for measles and mumps)
- healthcare personnel (for measles and mumps)
- living in a community experiencing an outbreak or recently exposed to the disease (for measles and mumps)
- planning to travel internationally (for measles and mumps)
- people who received inactivated (killed) measles vaccine or measles vaccine of unknown type during 1963–1967 should be revaccinated with two doses of MMR vaccine.
- people vaccinated before 1979 with either killed mumps vaccine or mumps vaccine of unknown type who are at high risk for mumps infection (e.g., persons who are working in a healthcare facility) should be considered for revaccination with 2 doses of MMR vaccine.

### Why do healthcare personnel need vaccination or other evidence of immunity to measles, mumps, and rubella?

People who work in medical facilities are at much higher risk for being exposed to disease than is the general population. Making sure that all employees are immune to these diseases protects both the employee and the patients with whom he or she may have contact. All people working in a healthcare facility in any capacity should have documentation of vaccination or evidence of immunity, including full- or part-time employees, medical or non-medical, paid or volunteer, students, and those with or without direct patient responsibilities.

Facilities should consider vaccinating with MMR vaccine healthcare personnel born before 1957 who lack laboratory evidence of measles, mumps, and

rubella immunity or laboratory confirmation of previous disease. These facilities should vaccinate healthcare personnel with MMR during an outbreak of any of the diseases, regardless of birth year.

### 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), the American College of Obstetricians and Gynecologists, and the American College of Physicians (ACP) have all recommended this vaccine.

### How safe is this vaccine?

Hundreds of millions of doses of measles, mumps, and rubella vaccine prepared either as separate vaccines or as the combined MMR have been given in the United States, and its safety record is excellent.

### 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 people develop a mild rash. When they occur, fever and rash usually appear 7–12 days after vaccination. About 25% of adult women receiving MMR vaccine develop temporary joint pain, a symptom 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 not life-threatening. More severe reactions, including allergic reactions, are rare. Other severe problems (e.g., deafness, permanent brain damage) occur so rarely that experts cannot be sure whether they are caused by the vaccine or not.

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

Transmission of the vaccine viruses 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.

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**Who should NOT receive MMR vaccine?**

Anyone who had 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 (e.g., 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. Children and other household contacts of pregnant women should be vaccinated according to the recommended schedule. Women who are breast-feeding can be vaccinated.

Severely immunocompromised people should not be given MMR vaccine. This includes people 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 people with AIDS or HIV infection with signs of serious immunosuppression should not be given MMR, people with HIV infection who do not have laboratory evidence of severe immunosuppression can and should be vaccinated against measles.

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

In the past it was believed that people 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. 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 there is no association between MMR vaccine and autism.

For a summary of the issues on this topic, please read "Do Vaccines Cause Autism?" on the website of the Vaccine Education Center at Children's Hospital of Philadelphia. This discussion can be accessed at [www.chop.edu/centers-programs/vaccine-education-center/vaccines-and-other-conditions/vaccines-autism.html](http://www.chop.edu/centers-programs/vaccine-education-center/vaccines-and-other-conditions/vaccines-autism.html)

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: [www.immunize.org/catg.d/p2068.pdf](http://www.immunize.org/catg.d/p2068.pdf).

For more information, visit CDC's web page about vaccines and autism at [www.cdc.gov/vaccinesafety/concerns/autism/index.html](http://www.cdc.gov/vaccinesafety/concerns/autism/index.html)

**Can the live virus in the vaccine cause measles, mumps, and/or rubella?**

Because the measles, mumps, and rubella viruses in the MMR vaccine are weak versions of the disease viruses, they may cause a very mild case of the disease they were designed to prevent; however, it is usually much milder than the natural disease and is referred to as an adverse reaction to the vaccine.

**What if a pregnant woman inadvertently got the MMR vaccine?**

Women are advised not to receive any live virus vaccine during pregnancy as a safety precaution based on the theoretical possibility of a live vaccine causing disease (e.g., rubella virus leading to congenital rubella syndrome [CRS]).

Because a number of women have inadvertently received this vaccine while pregnant or soon before conception, the Centers for Disease Control and Prevention has collected data about the outcomes of their births. From 1971–1989, no evidence of CRS occurred in the 324 infants born to 321 women who received rubella vaccine while pregnant and continued pregnancy to term. As any risk to the fetus from rubella vaccine appears to be extremely low or zero, individual counseling of women in this situation is recommended, rather than routine termination of pregnancy.