
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 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) 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 case-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.

Beginning in the latter part of the 1980s, the incidence of measles increased due to large outbreaks in many U.S. 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 began a rapid decline during the 1990s. By 2004, only 37 cases were reported—a record low. However, new cases continue to be reported, primarily in populations that have refused vaccination for religious or personal belief reasons. In 2008, CDC received reports of 140 measles cases from 19 states and the District of Columbia—the highest number since 1996. Of the 127 cases in U.S.

residents, 120 had not been vaccinated or their vaccination status was unknown. Ninety-nine 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 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 single antigen mumps vaccine was available until 1975. 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?

The MMR vaccine is made by using 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 workers 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, for measles and mumps only, having documentation of disease that was diagnosed by a physician. 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 vaccine produces good immunity to measles (95–98%), mumps (97%), and rubella (95%). 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.

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. However, facilities should consider vaccinating healthcare workers born before 1957 who lack laboratory evidence (e.g., blood test) of measles, mumps, and rubella immunity or laboratory confirmation of previous disease with MMR vaccine. These facilities should vaccinate healthcare workers with MMR during an outbreak of any of the diseases, regardless of birth date.

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 workers (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)

Why do healthcare workers 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 workers 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.

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 benign. 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 de-

velop a rash. No special precautions (e.g., exclusion from school or work) need be taken.

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 without symptoms 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. 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 suggestion that MMR vaccine might lead to autism had its origins in research by Andrew Wakefield, a gastroenterologist, in the United Kingdom. In

1998, Wakefield and colleagues published an article in *The Lancet* claiming that the measles vaccine virus in MMR caused inflammatory bowel disease, allowing harmful proteins to enter the bloodstream and damage the brain. The validity of this finding was later called into question when it could not be reproduced by other researchers. 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. Wakefield was permanently barred from practicing medicine in the U.K. and *The Lancet* retracted the original article in 2010.

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 www.chop.edu/service/vaccine-education-center/hot-topics/autism.html

“MMR vaccine does not cause autism. Examine the evidence!” lists all the major studies related to this issue with links to journal article abstracts: 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: www.immunize.org/catg.d/p2068.pdf

For more information, visit CDC’s web page about MMR vaccine safety at www.cdc.gov/vaccinesafety/Vaccines/MMR/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.