

# TerranearPMC Safety Share

## Week of February 2, 2015 – Measles – It's Back!

In 2000, the United States declared that measles was eliminated from this country. In other words, since 2000, there has been an absence of a continuous disease transmission for 12 months or more in the U.S. While measles may have been observed in the country, measles materialized not from the local population, but rather from people from outside the United States who were infected and brought the disease into the country.

It was sometime between December 15 – 20, 2014 that health officials declared that the once-eradicated disease has returned. And experts have identified the spread of this latest health concern in the Happiest Place on Earth – Disneyland.

Measles, also known as rubeola (not to be confused with rubella, aka German Measles), is generally considered a childhood infection caused by the virus, *Measles virus* (MeV). It is a highly infectious, airborne disease where signs and symptoms first appear within 10 to 14 days and typically begins with fever, dry cough, runny nose and red eyes followed by conjunctivitis (inflamed eyes). Within a few days, a red rash appears throughout the body, consisting of large, flat blotches that often flow into one another. The rash usually first appears on the face and then spreads downward to the rest of the body. Tiny white spots with bluish-white centers on a red background may be observed inside the mouth on the inner lining of the cheek; also called Koplik's spots

According to medical experts, most of the people stricken with MeV do not understand how vaccines work and, as a result, didn't get them. As it turns out, the vast majority of the infected were unvaccinated against the disease, including kids who were too young for the shots as well as those known as "anti-vaxxers" who chose against them. And according to health officials, that's how an outbreak gets started. However, six of the cases got their measles-mumps-rubella vaccine—the MMR shot—and *still* managed to get infected. And all but two of them had gotten at least two doses, the standard recommendation. So what happened?

The measles vaccine is actually one of the most effective vaccines in the world. According to the medical research team at the CDC for measles, mumps, rubella and polio, two doses are 97 percent effective against infection. The measles vaccine is a live version of the virus, just weakened—or attenuated—so it doesn't cause severe symptoms. The vaccine replicates just like the full-on measles virus, inciting your immune system to produce antibodies against it. Those antibodies then protect against actual measles as well.

But in some people, that response just doesn't happen. No one knows why. Either your body doesn't produce enough antibodies, or the ones it does produce aren't specific enough to latch on to the virus and kill it. This is why the CDC recommends two doses of the vaccine: After the first dose, 5 to 7 percent of people won't have a good enough antibody response to protect them. A second dose ensures that enough people get antibodies above that protective threshold to control the disease. However, the CDC admits that even with two doses, there are some failures. This could be because the initial response isn't perfect, or because the response waned in some people.



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So what happened in Disneyland? If you have a group of 1,000 people concentrated in a small space, such as an amusement park where about 90 percent of them will be vaccinated. One person, maybe someone who contracted measles on a recent trip overseas, moves around, spreading the virus. Since measles is extremely contagious, 90% of the 100 people who aren't vaccinated (that's 90 people), will get infected. Then, of the 900 people who are vaccinated, 3 percent—27 people—get infected because they don't have full immunity.

By considering the scenario at Disneyland, it has been determined that six vaccinated infections were identified out of the 34 cases with known records. Now considering that 16 million or so visitors the park gets every year, it is quite reasonable to expect more unvaccinated people being exposed. Once vaccination levels dip below 90 or 95 percent, there aren't enough protected people to keep the disease in check: While the US, has remained diligent to vaccinate the population, according to Cristina Cassetti, program officer at the National Institute of Allergy and Infectious Diseases, these numbers are not 100% accurate due to fluctuations. So if vaccination levels dip down a little, you get a situation like Disneyland.

Thus, based on the tiered model of antibody response, we are left with a small percentage of vaccinated people that will be susceptible. Yet, even if you are one of the few where a desirable response from the MeV vaccine does not occur, it still makes sense to get vaccinated. Your antibody levels might not be high enough to completely protect you, but they'll still help. The CDC has seen vaccinated patients with measles who only get a rash for about an hour. And, importantly for persons in their 80's or older (whose immune systems are weaker) as well as infants, vaccinated patients are much less likely to transmit the disease to other people. Even if you're so *unlucky* to get infected after receiving a vaccination, getting a shot still helps to control the spread of disease.

Researchers are still trying to understand why people's immune systems respond differently. Once this is determined, we may be on the way to help create a more effective version of the vaccine.

But for the moment, the focus needs to be on vaccinating people to keep the disease from spreading like it has in Disneyland. 2014 was a banner year for the measles: 635 US residents were infected, more than the past four years combined. Without a change, those numbers will keep going up.

Measles is a serious disease. Affected individuals typically develop temperatures as high as 104 to 105.8 F – that's life-threatening!. People with measles can spread the virus to others for about eight days, starting four days before the rash appears and ending when the rash has been present for four days.

Call your doctor if you think you or your child may have been exposed to measles or if you or your child has a rash resembling measles. Review your family's immunization records with your doctor, especially before starting elementary school, before college and before international travel.

**Every man has a sane spot somewhere.**

Robert Louis Stevenson

