

Smallpox (variola virus)

What is it?

Smallpox is a serious, contagious, and sometimes fatal infectious disease. There is no specific treatment for smallpox disease, and the only prevention is vaccination. The name *smallpox* is derived from the Latin word for “spotted” and refers to the raised bumps that appear on the face and body of an infected person.

There are two clinical forms of smallpox. Variola major is the severe and most common form of smallpox, with a more extensive rash and higher fever. There are four types of variola major smallpox: ordinary (the most frequent type, accounting for 90% or more of cases); modified (mild and occurring in previously vaccinated persons); flat; and hemorrhagic (both rare and very severe). Historically, variola major has an overall fatality rate of about 30%; however, flat and hemorrhagic smallpox usually are fatal. Variola minor is a less common presentation of smallpox, and a much less severe disease, with death rates historically of 1% or less.

Smallpox outbreaks have occurred from time to time for thousands of years, but the disease is now eradicated after a successful worldwide vaccination program. The last case of smallpox in the United States was in 1949. The last naturally occurring case in the world was in Somalia in 1977. After the disease was eliminated from the world, routine vaccination against smallpox among the general public was stopped because it was no longer necessary for prevention.

Causes

Smallpox is caused by the variola virus that emerged in human populations thousands of years ago. Except for laboratory stockpiles, the variola virus has been eliminated. However, in the aftermath of the events of September and October, 2001, there is heightened concern that the variola virus might be used as an agent of bioterrorism. For this reason, the U.S. government is taking precautions for dealing with a smallpox outbreak.

Transmission

Generally, direct and fairly prolonged face-to-face contact is required to spread smallpox from one person to another. Smallpox also can be spread through direct contact with infected bodily fluids or contaminated objects such as bedding or clothing. Rarely, smallpox has been spread by virus carried in the air in enclosed settings such as buildings, buses, and trains. Humans are the only natural hosts of variola. Smallpox is not known to be transmitted by insects or animals.

A person with smallpox is sometimes contagious with onset of fever (prodrome phase), but the person becomes most contagious with the onset of rash. At this stage the infected

person is usually very sick and not able to move around in the community. The infected person is contagious until the last smallpox scab falls off.

Smallpox Disease

Incubation Period

(Duration: 7 to 17 days)

Not contagious

Exposure to the virus is followed by an incubation period during which people do not have any symptoms and may feel fine. This incubation period averages about 12 to 14 days but can range from 7 to 17 days. During this time, people are not contagious.

Initial Symptoms

(*Prodrome*)

(Duration: 2 to 4 days)

Sometimes contagious*

The **first symptoms** of smallpox include fever, malaise, head and body aches, and sometimes vomiting. The fever is usually high, in the range of 101 to 104 degrees Fahrenheit. At this time, people are usually too sick to carry on their normal activities. This is called the *prodrome* phase and may last for 2 to 4 days.

Early Rash

(Duration: about 4 days)

Most contagious

Rash distribution:



[View enlarged image.](#)

A **rash emerges** first as small red spots on the tongue and in the mouth.

These spots develop into sores that break open and spread large amounts of the virus into the mouth and throat. At this time, the person becomes **most contagious**.

Around the time the sores in the mouth break down, a rash appears on the skin, starting on the face and spreading to the arms and legs and then to the hands and feet. Usually the rash spreads to all parts of the body within 24 hours. As the rash appears, the fever usually falls and the person may start to feel better.

By the third day of the rash, the rash becomes raised bumps.

By the fourth day, the bumps fill with a thick, opaque fluid and often have a depression in the center that looks like a bellybutton. (This is a major distinguishing characteristic of smallpox.)

Fever often will rise again at this time and remain high until scabs form over the bumps.

Pustular Rash

(Duration: about 5 days)

Contagious

The bumps become **pustules**—sharply raised, usually round and firm to the touch as if there's a small round object under the skin. People often say the bumps feel like BB pellets embedded in the skin.

Pustules and Scabs

(Duration: about 5 days)

Contagious

The pustules begin to form a crust and then **scab**.

By the end of the second week after the rash appears, most of the sores have scabbed over.

Resolving Scabs

(Duration: about 6 days)

The scabs begin to fall off, leaving marks on the skin that eventually become pitted **scars**. Most scabs will have fallen off

Contagious three weeks after the rash appears.
The person is contagious to others until all of the scabs have fallen off.

Scabs resolved Scabs have fallen off. Person is no longer contagious.
Not contagious

* Smallpox may be contagious during the *prodrome* phase, but is most infectious during the first 7 to 10 days following rash onset.

Smallpox Vaccine

The smallpox vaccine helps the body develop immunity to smallpox. The vaccine is made from a virus called vaccinia which is a “pox”-type virus related to smallpox. The smallpox vaccine contains the “live” vaccinia virus—not dead virus like many other vaccines. For that reason, the vaccination site must be cared for carefully to prevent the virus from spreading. Also, the vaccine can have side effects (see the section “Smallpox Vaccine Safety” in this fact sheet). The vaccine does not contain the smallpox virus and cannot give you smallpox.

Currently, the United States has a big enough stockpile of smallpox vaccine to vaccinate everyone in the country who might need it in the event of an emergency. Production of new vaccine is underway.