

Smallpox (Variola)

What is smallpox?

Smallpox is an acute infectious disease caused by a virus. No one has naturally contracted smallpox since 1977. Smallpox was declared eradicated from the earth in 1980.

However, the events of September and October 2001 have emphasized the need to be prepared for a biologic attack using smallpox as a weapon.

How is smallpox spread?

Smallpox is highly contagious. A person with smallpox becomes most contagious with the onset of rash, but because the early rash can be missed, they are presumed infectious from the time the fever starts. At this stage, the person is almost always very sick and not able to move around in the community. The infected person is contagious until the last smallpox scab falls off. Smallpox is most often spread by the respiratory secretions of people with smallpox to people who have close (< 6 ft) face to face contact. Less often it is spread through direct contact with smallpox lesions of the skin and mucous membranes, or through contact with materials (e.g., bedding, clothing) contaminated by such lesions or scabs. Rarely, it is spread through airborne means. Humans are the only known hosts; animals or insects do not spread the virus.

What are the symptoms of smallpox?

The initial symptoms of smallpox, 7 to 17 days after exposure, include the acute onset of fever, chills, headache, nausea, vomiting and severe muscle aches. This stage generally lasts for two to four days and can be accompanied by flushing of the skin. By the fourth day of illness, the fever drops and the characteristic smallpox rash appears. The rash starts out flat or slightly thickened spots (known as macules) and quickly progresses to raised spots (known as papules). These papules continue to enlarge and become filled with a clear fluid, then referred to as vesicles. The fluid in the vesicles gradually changes from clear to pus-like, and the lesions are then referred to as pustules. During the pustule stage, a fever is common and the pustules start to form into scabs. Over time, the dried scab material falls off of the skin. This entire process takes three to four weeks, and the areas affected by the rash can be permanently scarred.

There are two types of smallpox: *variola major* and *variola minor*. **Variola major** is the more severe form and has a 30-50% fatality rate among those who are unvaccinated (3% in vaccinated persons). **Variola minor** has a 1-2% fatality rate in unvaccinated individuals. There are two rare and more serious

forms of smallpox. In the most severe, known as *purpura variolosa* or hemorrhagic-type smallpox, the initial stage of the illness (before the rash appears) is accompanied by a dark, purplish, blotchy flushing of the skin. People who developed *purpura variolosa* usually have a severe loss of blood into the skin and internal organs (hemorrhage), and die before the typical smallpox rash appears. About 3% of the persons with *variola major* develop *purpura variolosa*.

Another rare and deadly form of smallpox is referred to as *flat-type smallpox* affects about 5% of the persons with *variola major*. Persons with this form of the disease have lesions that develop more slowly, never raised above the surface of the skin, and feel soft to the touch. If people with flat smallpox survive, they rarely experience severe scarring. Both *purpura variolosa* and flat smallpox are virtually never seen in persons infected with *variola minor*.

Smallpox can be confused with chickenpox, but several features of these diseases are significantly different:

1. The initial symptoms of smallpox are much more severe than those of chickenpox (i.e., high fever, severe muscle aches, etc.).
1. Smallpox rash is most common on exposed portions of the body: face, forearms, wrists, palms, lower legs, feet, and soles. (Chickenpox is most common on covered areas of the body.)
2. Smallpox rash lesions in one part of the body tend to be at the same stage of development. (With chickenpox, it is common to have more than one eruption of pox lesions and on any one part of the body, there are lesions that are in different stages of maturation.)

Smallpox lesions tend to be deeper in the skin than chickenpox lesions, hard to the touch, and the vesicles are tough to break.

How soon after exposure do symptoms appear?

The first symptoms of smallpox usually occur within 10 to 14 days after exposure, with the rash appearing two to four days later. The first symptoms could appear, however, as early as seven days after exposure, or as late as 17 days.

How is smallpox diagnosed?

Smallpox can be diagnosed based on the patient's clinical signs and symptoms. The disease can be definitively diagnosed by isolation of the virus from the blood or lesions, or by identification of antibodies in the blood made in response to the virus. The diagnosis of smallpox needs to be made in specialized laboratories with appropriate testing techniques and measures to protect the laboratory workers.

Is there any treatment for smallpox?

There is no proven treatment for smallpox, but research to evaluate new antiviral agents is ongoing. Patients with smallpox can benefit from supportive therapy such as intravenous fluids, medicine to control fever or pain and antibiotics for any secondary bacterial infections that may occur.

Vaccinia immune globulin (VIG) can be used primarily to treat complications of smallpox vaccination. VIG could also be offered to persons exposed to smallpox as a prophylaxis. However, VIG must be given before their lesions began to develop, and it is most effective when given with smallpox vaccination.

How can smallpox be prevented?

There is a vaccine to prevent smallpox that was routinely administered in the United States until the early 1970s. **Routine vaccination of the civilian population for this disease is not currently recommended.** The risk of adverse events resulting from the vaccine, accompanied by the rapid decrease in smallpox around the world in the 1970s, was part of the justification for the U.S. to discontinue routine vaccination against smallpox before the disease was eradicated in 1977.

The vaccine is made from a virus called vaccinia, which is another "pox"-type virus related to smallpox. The vaccine helps the body develop immunity to smallpox. **The vaccine does not contain the smallpox virus and cannot cause smallpox.**

Getting smallpox vaccine before exposure will protect about 95 percent of people from getting smallpox. Vaccination within three days of exposure will prevent or significantly lessen the severity of smallpox in the vast majority of people. Vaccination four to seven days after exposure likely offers some protection from disease or may modify the severity of disease. Solid protection lasts for three to five years after vaccination. Partial protection lasts longer, but people need to be revaccinated if too much time has passed.

Until recently, the U.S. government provided the smallpox vaccine only to a few hundred scientists and medical professionals who work with smallpox and similar viruses in a research setting. After the events of September and October 2001, however, the U.S. government took further actions to improve its level of preparedness against terrorism. For smallpox, this included updating a response plan and ordering enough smallpox vaccine to immunize the American public in the event of a smallpox outbreak. The plans are in place, and there is sufficient vaccine available to immunize everyone who might need it in the event of an emergency.

If someone is exposed to smallpox, is it too late to get a vaccination?

Vaccination within 3 days of exposure will completely prevent or significantly modify smallpox in the vast majority of persons. Vaccination 4 to 7 days after exposure likely offers some protection from disease or may modify the severity of disease.

How long does a smallpox vaccination last?

Past experience indicates that the first dose of the vaccine offers protection from smallpox for 3 to 5 years, with decreasing immunity thereafter. If a person is vaccinated again later, immunity lasts longer. A report from Europe suggests that people vaccinated 10 or 20 or more years ago have enough immunity to lessen their chance of death if infected. However, these people need another dose of smallpox vaccine to restore their immunity.

Where can I get more information?

- Your personal doctor.
- Your local health department listed in your telephone directory.
- The Utah Department of Health, Office of Epidemiology (801) 538-6191.

http://www.health.utah.gov/epi/spox-general_public.htm

<http://www.hhs.gov/smallpox/index.html>

<http://www.bt.cdc.gov/agent/smallpox/index.asp>

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