
Diphtheria: Questions and Answers

Information about the disease and vaccines

What causes diphtheria?

Diphtheria is caused by a bacterium, *Corynebacterium diphtheriae*. The actual disease is caused when the bacteria release a toxin, or poison, into the person's body.

How does diphtheria spread?

Diphtheria bacteria live in the mouth, throat, and nose of an infected person and can be passed to others by coughing or sneezing. Occasionally, transmission occurs from skin sores or through articles soiled with discharge from sores of infected persons.

How long does it take to show signs of diphtheria after being exposed?

The incubation period is short: 2–5 days, with a range of 1–10 days.

What are the symptoms of diphtheria?

Early symptoms of diphtheria may mimic a cold with a sore throat, mild fever, and chills. Usually, the disease causes a thick coating at the back of the throat, which can make it difficult to breathe or swallow. Other body sites besides the throat can also be affected, including the nose, larynx, eye, vagina, and skin.

How serious is diphtheria?

Diphtheria is a serious disease: 5%–10% of all persons with diphtheria die. Up to 20% of cases lead to death in certain age groups of individuals (e.g., children younger than age 5 years and adults older than age 40 years).

What are possible complications from diphtheria?

Most complications of diphtheria are due to the release of the toxin, or poison. The most common complications are inflammation of the heart, leading to abnormal heart rhythms, and inflammation of the nerves, which may cause temporary paralysis of some muscles. If the paralysis affects the diaphragm (the major muscle for breathing), the patient may develop pneumonia or respiratory failure. The thick membrane coating at the back of the throat may cause serious breathing problems, even suffocation.

How do I know if someone has diphtheria?

The diagnosis of diphtheria can only be confirmed after a physician takes a small sample of the infected

material from the patient's throat (or other site) and has the sample tested in a laboratory. But because this disease progresses quickly, treatment usually should begin based on the health professional's assessment of the patient.

Is there a treatment for diphtheria?

Diphtheria is treated with both antibiotics and with diphtheria antitoxin. Diphtheria antitoxin is produced in horses and was first used in the United States in 1891. Antitoxin does not get rid of toxin that is already attached to the body's tissues, but will neutralize any circulating poison and will prevent the disease from getting worse. The patient should be tested for sensitivity to this antitoxin before it is given.

How long is a person with diphtheria contagious?

The disease usually becomes non-contagious 48 hours after antibiotics are started. However, some individuals continue to carry the diphtheria bacterium even after antibiotic therapy, and treatment should be continued until patients have two consecutive negative cultures. People providing care for an individual with diphtheria should take standard contact precautions and make sure they have been adequately immunized against diphtheria.

How common is diphtheria in the United States?

Diphtheria was once a greatly feared illness in the United States. In the 1920s, there were between 100,000 and 200,000 cases of diphtheria each year with 13,000–15,000 deaths. Because of widespread immunization and better living conditions, diphtheria is now rare in the United States (during 1998–2004, seven cases of respiratory diphtheria were reported to CDC).

Recent surveys have found that immunity decreases with age, and only 30% of U.S. adults age 60–69 years are protected against diphtheria. This is a concern because the disease continues to occur in other parts of the world. For example, after the breakup of the former Soviet Union, vaccination rates fell, and large outbreaks of diphtheria began in 1990 in the Newly Independent States. From 1990 to 1998, more than 150,000 people got sick from diphtheria and more than 5,000 people died. This situation, and other outbreaks around the world, illustrates what

can happen when immunity levels fall. Outbreaks in other countries also increase the risk of diphtheria importation into the United States.

Can you get diphtheria more than once?

Yes. Even individuals recovering from diphtheria should be immunized against the disease as soon as possible.

DIPHTHERIA VACCINE

When did diphtheria vaccine become available?

The first inactivated toxin, or toxoid, against diphtheria was developed around 1921, but it was not widely used until the 1930s. In the 1940s, diphtheria toxoid was combined with pertussis vaccine and tetanus toxoid to make the combination DTP vaccine.

In 1991, DTaP vaccine was licensed in the United States. The diphtheria component of this combination vaccine is the same as in the DTP vaccine; however, the pertussis component is a more purified “acellular” version, which produces fewer side effects.

In 2005, two new tetanus toxoid-diphtheria-acellular pertussis (Tdap) vaccines were licensed. These vaccines are the first pertussis-containing vaccines that can be given to persons older than 7 years.

Diphtheria is not available as a single antigen vaccine.

What kind of vaccine is it?

The diphtheria vaccine is an inactivated toxin called a toxoid. It is made by growing the bacteria in a liquid medium and purifying and inactivating the toxin.

DTaP and Tdap vaccines are “inactivated” vaccines. Inactivated vaccines do not contain live bacteria or virus and cannot reproduce, which is why multiple doses are needed to produce immunity.

What’s the difference between all the vaccines containing diphtheria toxoid?

Diphtheria and tetanus toxoids can be combined as DT (for children younger than age 7 years) or as Td (for persons age 7 years and older). It can also be combined with tetanus and pertussis as DTaP (for children younger than age 7 years) or as Tdap (for persons ages 10 through 64 years). Lastly, DTaP is also part of four childhood combination vaccines that include other vaccines (e.g., IPV, Hib, HepB).

Children age 7 years and older as well as adults are given a different vaccine -- either Td or Tdap.

How is this vaccine given?

The DTaP, DT, Td, and Tdap preparations are all given as an injection in the anterolateral thigh muscle (for infants and young toddlers) or in the deltoid muscle (for older children and adults).

Who should get this vaccine?

Infants should receive DTaP vaccine as part of their routine immunization. Adults should be given a routine booster dose of Td every 10 years. A single dose of Tdap is recommended for persons age 11 years and older in place of one of the Td doses, preferably the first one.

How many doses of DTaP vaccine are recommended?

The usual schedule for infants is a series of four doses given at two, four, six, and 15–18 months of age. A fifth shot, or booster dose, is recommended at 4–6 years of age, unless the fourth dose was given late (after the fourth birthday).

Because immunity to diphtheria wanes with time, individuals should receive a booster dose of Td (adult tetanus and diphtheria) every ten years. A one-time dose of Tdap vaccine should be substituted for one booster dose of adult Td.

Should adults who weren’t vaccinated as children receive this vaccine as adults?

Yes. Adults or children ages seven years and older without documentation of tetanus and diphtheria vaccination should receive a primary series of three doses of tetanus and diphtheria toxoid (Td). The first two doses should be separated by 4–8 weeks, and the third dose given 6–12 months after the second dose. Tdap vaccine should be substituted for one of these three doses, preferably the first dose.

Who recommends this vaccine?

The Centers for Disease Control and Prevention (CDC), the American Academy of Pediatrics (AAP), and the American Academy of Family Physicians (AAFP) all recommend this vaccine.

How safe is this vaccine?

Most people have no serious reactions from DTaP vaccine. The most common reactions are local reactions at the injection site, such as soreness, redness, and swelling. Other possible reactions may include fussiness, mild fever, loss of appetite, tiredness, and vomiting. The use of the more purified DTaP instead of DTP has decreased even these mild reactions. Tdap is a new vaccine but trials have shown it to be safe.

What side effects have been reported with this vaccine?

About 20%–40% of children have some local reaction such as pain, redness, or swelling after the first 3 doses of DTaP. Such local reactions seem to be more frequent after the fourth and/or fifth doses. A temperature of 101° F or higher is reported in 3%-5% of DTaP recipients. Less common reactions (persistent crying, higher fever, febrile seizure) are rare and generally occur in fewer than 1 in 10,000 doses.

If a child has a medical reason not to receive the pertussis component of the DTaP vaccine, they can and should still be vaccinated against just diphtheria and tetanus with DT-pediatric vaccine.

The most frequently reported side effects following vaccination with Tdap were headache, generalized body aches, and tiredness.

For adults receiving Td vaccine, localized non-serious side effects are common (redness, soreness, etc.) but are generally self-limiting and require no

treatment. Receiving more doses than recommended of any tetanus toxoid-containing vaccine can lead to increased local reactions, such as painful swelling of the arm, so it is important for adults to keep an up-to-date record of all their vaccine doses.

How effective is this vaccine?

Approximately 95% of individuals have a protective level of antitoxin in their blood after a properly spaced primary series of vaccine (four doses of DTaP for young children, three of Td/Tdap for adults).

Who should NOT receive diphtheria vaccine?

People who have had a serious allergic reaction to a vaccine component or a prior dose of DTaP, DT, Td, or Tdap vaccine should not receive another. Persons with a moderate or severe illness should postpone receiving the vaccine until their condition has improved.

Can the vaccine cause diphtheria?

No.