

## YELLOW FEVER

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### GENERAL INFORMATION

#### Introduction

Yellow fever is a viral disease that causes fever, death of liver and kidney tissue, bleeding, and shock. Up to 90% of unimmunized travelers infected with yellow fever will die.

#### Transmission

Yellow fever is transmitted by mosquitoes that become infected when they take blood from infected monkeys or humans. These mosquitoes remain infectious for life and are aggressive biters.

#### Epidemiology

Yellow fever occurs in tropical sub-Saharan Africa and tropical South America, where it is endemic in monkeys. In both continents, yellow fever can be transmitted in jungle areas, savannah, and in urban areas.

#### Risk

While the risk of yellow fever may appear small, there is no treatment and fatality rates in unimmunized travelers are high.

Risk depends on the time of year, the traveler's itinerary and activities, and presence of yellow fever virus.

- During 1970-2010, 9 cases of yellow fever were reported in unvaccinated travelers from the U.S. and Europe who traveled to West Africa or South America; of these, 8 died.
- Risk of illness and death for travelers to South America might be about 10 times lower than it is for travelers to Africa, because the rate of transmission is lower.
- The mosquitoes that cause yellow fever are also found in Mexico and southern and southeastern Asia.

#### Symptoms

The disease is mild in 80-90% of infections, with sudden onset of fever, headache, and muscle aches lasting 2-4 days. In severe cases, these initial symptoms are more severe, and there may be bleeding from the nose and gums. On the third day, fever may decrease but widespread hemorrhage, delirium, and anuria (lack of urine) develop, followed by jaundice, vomiting of blood, coma, and death.

#### Need for Medical Assistance

Medical assistance should be sought if a traveler has a fever and symptoms of yellow fever disease (described above) during travel in or after returning from an endemic country. Treatment is supportive and frequently ineffective.

### PREVENTION

#### Non-Vaccine

- Travelers should avoid areas where there is an ongoing outbreak of yellow fever in humans.
- Daytime and nighttime insect precautions should be taken regardless of vaccination status or country requirements. The mosquitos that cause yellow fever can also cause dengue fever; depending on the itinerary, there may be a risk of other mosquito-borne illnesses. See *Insect Precautions*.

## Vaccine

- Yellow fever vaccine is a weakened live virus vaccine given as 1 dose.
- Vaccination is nearly 100% protective, and, in principle, every traveler to an area in which there is a risk of yellow fever transmission should be vaccinated.
- In the U.S., immunization is available only at centers designated by state health departments.
- Immunity from 1 dose of yellow fever vaccine is thought to last a lifetime; however, for purposes of fulfilling entry requirements (see "Special Considerations"), revaccination is required every 10 years.

## Who Should Receive the Vaccine

Yellow fever vaccination is required for:

- Travelers, when required for entry into a country
  - The purpose of vaccination is to prevent the importation of yellow fever into a country where yellow fever does not occur but competent mosquito vectors are present.
  - To satisfy entry requirements, immunization must be within 10 days of entry into the country and no more than 10 years before entry. (The vaccine is valid for 10 years.)
  - Proof of vaccination must be entered in the *International Certificate of Vaccination or Prophylaxis*. See "Special Considerations."

Yellow fever vaccination is recommended for:

- Certain laboratory personnel handling the virus
- Travelers aged 9 months and older who, if they are:
  - Traveling to or living in areas where there is risk of yellow fever transmission
  - Traveling to non-risk areas of countries where risk of yellow fever transmission exists only in other regions of that country but who do not have assuredly fixed plans
  - Long-stay travelers to any country, any part of which has risk of yellow fever transmission
  - Native-born residents in urban areas of countries with risk of yellow fever transmission (usually in South America and Africa) if traveling to rural areas, even if these countries have not officially reported the disease
- Travelers aged 6-8 months should be vaccinated only if they will be at unavoidable high risk.

## Who Should Not Receive the Vaccine

Persons should not receive this vaccine if they:

- Are aged less than 6 months (because of the possibility of vaccine-associated encephalitis)
- Have had a severe allergic reaction to a previous dose or component (e.g., egg) of the vaccine
- Have an altered immune status due to:
  - Thymus disorder with abnormal immune function
  - Immunodeficiency, cancer, organ transplantation within the past 2 years
  - Immunosuppressive therapy
  - AIDS/HIV with severe immunosuppression

Persons aged 60 years and older, especially those who are being vaccinated for the first time, may be at risk for vaccine-associated viscerotropic disease. See "Risks and Side Effects."

Persons with multiple sclerosis (MS) should receive this vaccine only in very high-risk circumstances where travel is unavoidable and after thorough discussion with their health care provider. See "Risks and Side Effects."

Persons who are moderately or severely ill usually should wait until they recover before getting this vaccine.

## Risks and Side Effects

Reactions to this vaccine are generally mild and can include pain, warmth, redness, or swelling at the injection

site; low-grade fever, mild headache, and muscle ache can also occur. Most of these reactions occur within the first 2-3 days after vaccination but can occur up to 14 days later.

Serious side effects are rare.

- Children less than 6 months of age are at risk for vaccine-related encephalitis.
- Other neurological reactions or viscerotropic reactions (fever and multi-organ failure) can also occur but are very rare.
  - Viscerotropic reactions occur only in first-time vaccinees.
  - Travelers aged 60 years and older are at increased risk for viscerotropic reactions.
- Anaphylaxis (severe allergic reaction) can occur.
- There is a tenfold increase in the risk of relapse in persons with MS.

Travelers should be aware of potential risks and should receive yellow fever vaccine only if clearly indicated. Any person who chooses not to receive this vaccine should not travel to risk areas.

There is a rare chance that serious problems or even death could occur after receiving any medicine or vaccine. If a significant or unusual problem occurs after receiving the vaccine, the patient should call or visit the health care provider.

## Timing

Yellow fever vaccine is given as a single injection.

- If a country requires the vaccine for entry, the vaccine must be given at least 10 days before and within the past 10 years of entering the country. For requirement purposes, the vaccine is valid for 10 years.
- If other live-virus vaccines (such as varicella) are necessary for travel, they should be given on the same day as the yellow fever vaccination, if possible; otherwise they must be given at least 30 days apart, in which case travelers might have to allow up to 4-8 weeks before travel for completion of the administration of all live-virus vaccines. Two exceptions are oral typhoid vaccine and measles vaccine, either of which can be given at the same time as yellow fever vaccine or at any time before or after yellow fever vaccine.

A booster dose is needed every 10 years for purposes of fulfilling entry requirements. For personal protection, however, protection is probably lifelong.

## SPECIAL CONSIDERATIONS

### Entry Requirements

Entry requirements are determined by each country.

For countries that require yellow fever vaccination, proof of immunization is required before the traveler is allowed into the country. This information must be recorded and validated in an official form called the *International Certificate of Vaccination or Prophylaxis (ICVP)*. The vaccine must be given within 10 days of entering the country and not more than 10 years previously. The certificate is valid for 10 years.

Many countries have no entry requirements, while others require proof of yellow fever vaccination for all arriving travelers. Some countries require proof of yellow fever vaccination if a traveler came from or traveled through (including airport transit) a country that has a risk of transmission of yellow fever, if that country is maintained on a list and regarded as a risk area. Border officials in a small number of African countries may request a bribe for failure to produce proof of yellow fever vaccination despite the lack of an entry requirement.

If proof of vaccination against yellow fever is required for entry into a country and a traveler does not have valid documentation of vaccination, he or she could be denied entry, quarantined, or vaccinated at the point of entry (which is not desirable, because of the risk of contaminated needles or syringes and exposure to hepatitis B, HIV, etc.).

If a traveler cannot receive the vaccine due to a medical reason (e.g., allergic to the vaccine), and the vaccine is required for entry, the health care provider can provide the traveler with an exemption (waiver) letter. The exemption is valid only for the current trip. Acceptance of a waiver letter is at the discretion of the destination country.

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