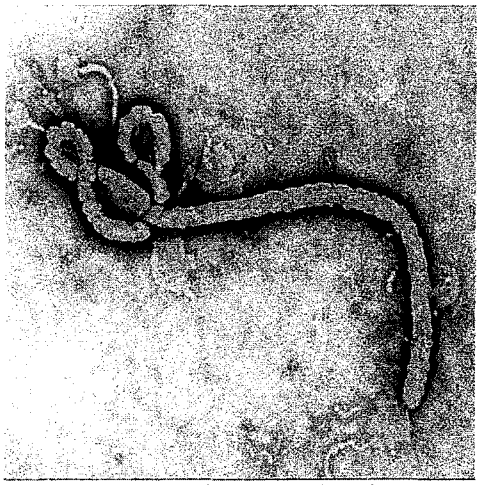
EBOLA

This information was provided by the CDC (Centers of Disease Control and Prevention) - http://www.cdc.gov/vhf/ebola/

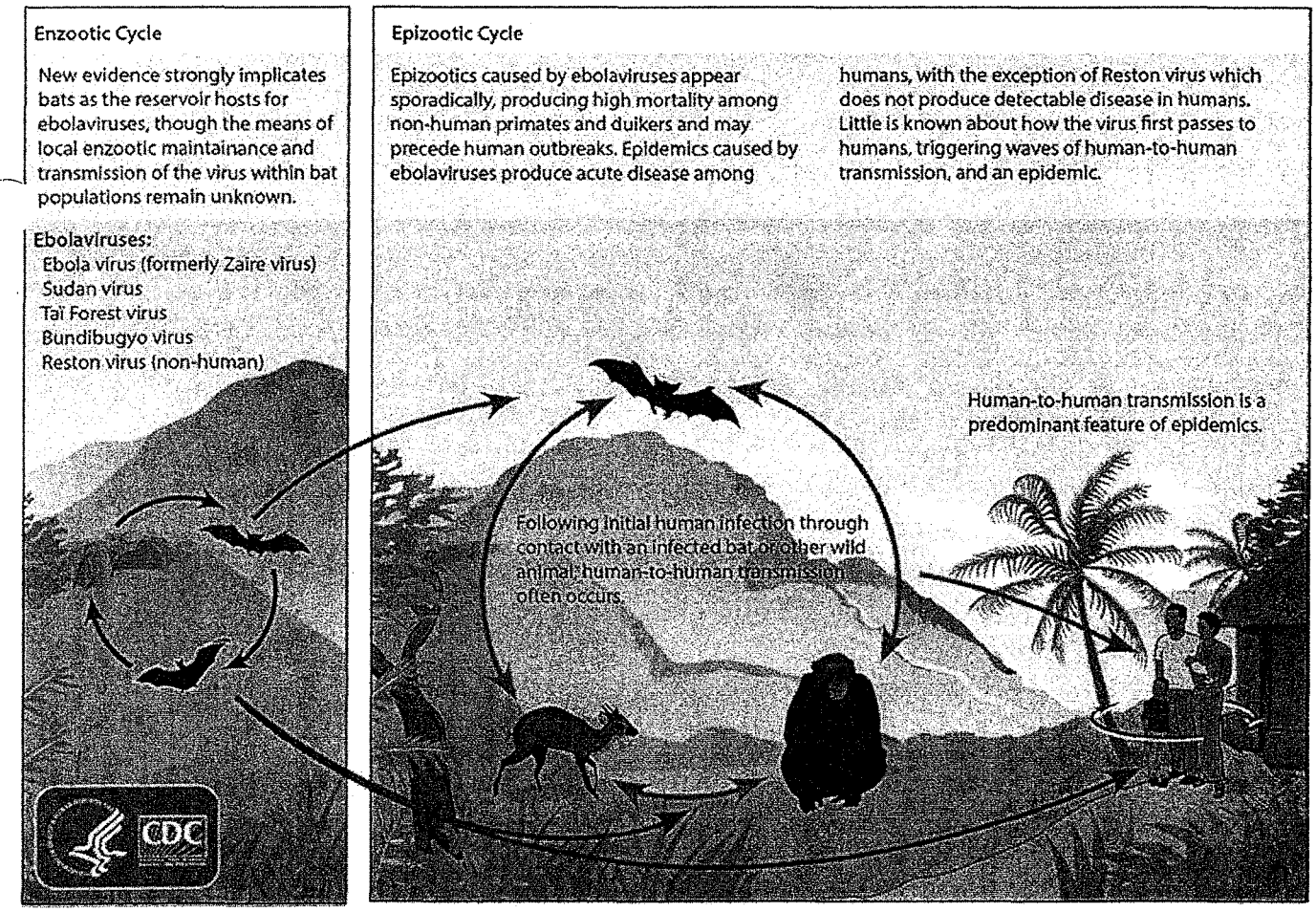


Micrograph of Ebola Virus

Ebola, previously known as Ebola hemorrhagic fever, is a rare and deadly disease caused by infection with one of the Ebola virus strains. Ebola can cause disease in humans and nonhuman primates (monkeys, gorillas, and chimpanzees).

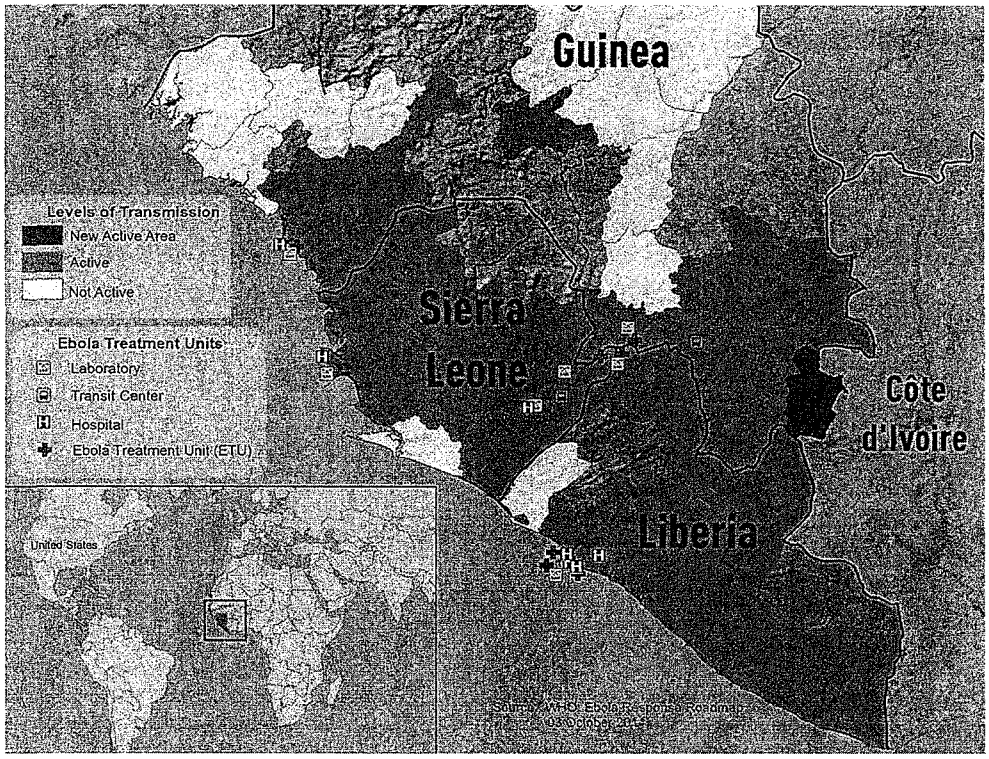
Ebola is caused by infection with a virus of the family *Filoviridae*, genus *Ebolavirus*. There are five identified Ebola virus species, four of which are known to cause disease in humans: Ebola virus (*Zaire ebolavirus*); Sudan virus (*Sudan ebolavirus*); Taï Forest virus (*Taï Forest ebolavirus*, formerly *Côte d'Ivoire ebolavirus*); and Bundibugyo virus (*Bundibugyo ebolavirus*). The fifth, Reston virus (*Reston ebolavirus*), has caused disease in nonhuman primates, but not in humans.

Ebolavirus Ecology



This graphic illustrates the life cycle of the ebola virus. Bats are strongly implicated as both reservoirs and hosts for the ebola virus. Of the five identified ebola virus subtypes, four are capable of human-to-human transmission. Initial infections in humans result from contact with an infected bat or other wild animal. Strict isolation of infected patients is essential to reduce onward ebola virus transmission.

Ebola was first discovered in 1976 near the Ebola River in what is now the Democratic Republic of the Congo. Since then, outbreaks have appeared sporadically in Africa. The current Ebola epidemic is the largest in history, affecting multiple countries in West Africa, with widespread transmission occurring in Sierra Leone, Guinea, and Liberia (see map below).



On September 30, 2014, CDC confirmed, the *first travel-associated case of Ebola to be diagnosed in the United States.* Eric Duncan travelled from Liberia and arrived in Dallas Texas on September 20th. At the time of his travel, he did NOT exhibit any symptoms of Ebola. However, 8 days later Duncan was hospitalized and tested positive for Ebola. He died Wednesday 10/08. 2014. There are many questions surrounding his illness and treatment; to further complicate things, little is known about his medical history. As a result of Mr. Duncan's death, screening of international travelers is being implemented to minimize the potential global spread of Ebola.

Symptoms of Ebola include

- Fever (greater than 38.6°C or 101.5°F)
- Severe headache
- Muscle pain
- Weakness
- Diarrhea
- Vomiting
- Abdominal (stomach) pain
- Unexplained hemorrhage (bleeding or bruising)

Symptoms may appear anywhere from 2 to 21 days after exposure to Ebola, but the average is 8 to 10 days. Recovery from Ebola depends on good supportive clinical care and the patient's immune response. People who recover from Ebola infection develop antibodies that last for at least 10 years. Once someone recovers from Ebola, they can no longer spread the virus. However, Ebola virus has been found in semen for up to 3 months. People who recover from Ebola are advised to abstain from sex or use condoms for 3 months.

When an infection does occur in humans, the virus can be spread in several ways to others. Ebola is spread through direct contact (through broken skin or mucous membranes in, for example, the eyes, nose, or mouth) with

- blood or body fluids (including but not limited to urine, saliva, sweat, feces, vomit, breast milk, and semen) of a person who is sick with Ebola
- objects (like needles and syringes) that have been contaminated with the virus
- infected animals
- Ebola is not spread through the air or by water, or in general, by food. However, in Africa, Ebola may be spread as a result of handling bushmeat (wild animals hunted for food) and contact with infected bats. There is no evidence that mosquitos or other insects can transmit Ebola virus. Only mammals (for example, humans, bats, monkeys, and apes) have shown the ability to become infected with and spread Ebola virus.

Healthcare providers caring for Ebola patients and the family and friends in close contact with Ebola patients are at the highest risk of getting sick because they may come in contact with infected blood or body fluids of sick patients. During outbreaks of Ebola, the disease can spread quickly within healthcare settings (such as a clinic or hospital). Exposure to Ebola can occur in healthcare settings where hospital staff are not wearing appropriate protective equipment, including masks, gowns, and gloves and eye protection.

Dedicated medical equipment (preferable disposable, when possible) should be used by healthcare personnel providing patient care. Proper cleaning and disposal of instruments, such as needles and syringes, is also important. If instruments are not disposable, they must be sterilized before being used again. Without adequate sterilization of the instruments, virus transmission can continue and amplify an outbreak. Ebola is killed with hospital-grade disinfectants (such as household bleach). Ebola on dried on surfaces such as doorknobs and countertops can survive for several hours; however, virus in body fluids such as blood) can survive up to several days at room temperature.

FAQs

Has the first patient to become sick in this outbreak, know as "patient zero" been identified?

Reports in the medical literature and elsewhere have attempted to identify the patient who might have been the initial person infected in the West Africa Ebola outbreak. It's important for CDC to learn as much as it can about the source and initial spread of any outbreak. With regard to the West Africa Ebola outbreak, tracing the lineage of how Ebola has spread thus far can help CDC apply that knowledge toward better prevention and care techniques. The knowledge gained in this work might entail details about specific patients. CDC generally refrains, however, from identifying particular patients in any aspect of an outbreak.

Can hospitals in the United States care for an Ebola patient?

Any U.S. hospital that is following CDC's infection control recommendations and can isolate a patient in their own room with a private bathroom is capable of safely managing a patient with Ebola.

Why were the ill Americans with Ebola brought to the U.S. for treatment? How is CDC protecting the American public?

A U.S. citizen has the right to return to the United States. Although CDC can use several measures to prevent disease from being introduced in the United States, CDC must balance the public health risk to others with the rights of the individual. In this situation, the patients who came back to the United States for care were transported with appropriate infection control procedures in place to prevent the disease from being transmitted to others.

s there a danger of Ebola spreading in the U.S.?

Ebola is not spread through casual contact; therefore, the risk of an outbreak in the U.S. is very low. We know how to stop Ebola's further spread: thorough case finding, isolation of ill people, contacting people exposed to the ill person and further isolation of contacts if they develop symptoms. The U.S. public

health and medical systems have had prior experience with sporadic cases of diseases such as Ebola. In the past decade, the United States had 5 imported cases of Viral Hemorrhagic Fever (VHF) diseases similar to Ebola (1 Marburg, 4 Lassa). None resulted in any transmission in the United States.

Were people who were on the plane with Mr. Duncan placed at risk for contracting Ebola?

A person must have symptoms to spread Ebola to others. The ill person did not exhibit symptoms of Ebola during the flights from West Africa and CDC does not recommend that people on the same commercial airline flights undergo monitoring. The person reported developing symptoms five days after the return flight. CDC and public health officials in Texas are taking precautions to identify people who have had close personal contact with the ill person and health care professionals have been reminded to use meticulous infection control at all times.

What is ZMapp?

ZMapp, being developed by Mapp Biopharmaceutical Inc., is an experimental treatment, for use with individuals infected with Ebola virus. It has not yet been tested in humans for safety or effectiveness. The product is a combination of three different monoclonal antibodies that bind to the protein of the Ebola virus.

How effective is the experimental treatment?

It is too early to know whether ZMapp is effective, since it is still in an experimental stage and has not yet been tested in humans for safety or effectiveness. Some patients infected with Ebola virus do get better spontaneously or with supportive care. However, the best way to know if treatment with the product is efficacious is to conduct a randomized controlled clinical trial in people to compare outcomes of patients who receive the treatment to untreated patients. No such studies have been conducted. It's important to note that the standard treatment for Ebola remains supportive therapy. This includes the following measures:

- balancing the patients' fluids and electrolytes;
- maintaining their oxygen status and blood pressure; and
- treating them for any complicating infections.

In addition, the most effective way to stop the current Ebola outbreak in West Africa is meticulous work in finding Ebola cases, isolating and caring for those patients, and tracing contacts to stop the chains of transmission. It means educating people about safe burial practices and having health care workers strictly follow infection control in hospitals. This is how all previous Ebola outbreaks have been stopped.

Why aren't more people getting ZMapp?

At this time, very few courses of this experimental treatment have been manufactured. The manufacturer has indicated that the available doses have been distributed. Since the product is still in an experimental stage, it is too early to know whether ZMapp is effective. The manufacturer of this experimental treatment continues to research and evaluate the product's safety and effectiveness. It has not yet been tested in humans for safety or effectiveness and much more study is needed.

Is ZMapp available under the Food and Drug Administration's expanded access to investigational drugs?

Currently there are only experimental treatments for Ebola virus infection in the earliest stages of development. When a drug is not approved, the FDA can authorize access to potentially promising products through other mechanisms, such as through an emergency Investigational New Drug (IND) application. In order for an experimental treatment to be administered in the U.S., such a request must be submitted to and authorized by the FDA. The FDA cannot comment on the specifics of ongoing drug development programs and cannot reveal information that is not otherwise public concerning submissions covering such programs such as IND applications submissions. The FDA stands ready to work with companies and investigators treating these patients.

Is ZMapp a vaccine?

No. ZMapp is being developed as a therapeutic product for treatment of people infected with Ebola virus, but not to prevent infection in the same manner as a vaccine. The best way to prevent infection urrently is with stringent infection control measures.

What's the difference between therapy and vaccine?

Vaccines are usually given to people before they are exposed to a virus or bacteria that cause a disease. A vaccine stimulates the immune system to generate antibodies and cellular immunity that can fight off an infection if it were to occur. Typically, therapeutics are provided to people who are already infected with the virus. With the experimental ZMapp treatment, the monoclonal antibodies bind to the virus, so that the human immune system can clear the virus.

Questions: Please answer the following questions thoughtfully and write you answers in complete and coherent sentences! Note that you may have to use your textbook or the Internet to fully answer some of these questions.

1. Ebola is a virus. Describe the differences between a virus and bacteria.
2. Why is the outbreak of Ebola in West Africa considered an epidemic?
3. Identify what researchers believe to be the origin of the Ebola virus.
4. How is Ebola transmitted among humans?
5. Why is it important for researchers to try to identify "Patient Zero"?
6. Why is Ebola considered to be a hemorrhagic virus?
7. Describe the protocol for treating Ebola patients.
8. Describe the experimental procedures that still need to be carried out to test the safety of ZMapp. (think science method and human trials)
9. Do you think the FDA should release ZMapp to Ebola victims without further testing? Explain your answer.
10. Based on this reading what is the function of a vaccine?
11. How has this article been helpful to you in terms of understanding global current events?