



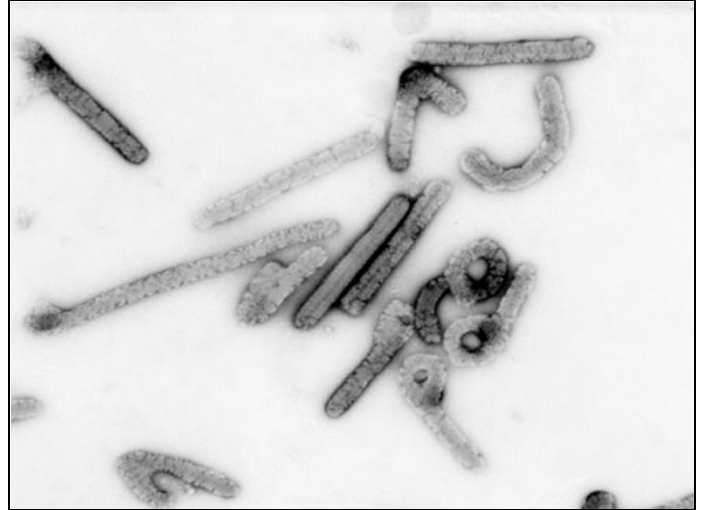
# Filovirus

## Fact Sheet

### What are Filoviruses?

Filoviruses belong to a virus family called Filoviridae and can cause severe hemorrhagic fever in humans and nonhuman primates. So far, only two members of this virus family have been identified: Marburg virus and Ebola virus. Four species of Ebola virus have been identified: Ivory Coast, Sudan, Zaire, and Reston. Ebola-Reston is the only known filovirus that does not cause severe disease in humans; however, it can be fatal in monkeys.

Structurally, filovirus virions (complete viral particles) may appear in several shapes, a biological feature called pleomorphism. These shapes include long, sometimes branched filaments, as well as shorter filaments shaped like a "6", a "U", or a circle. Viral filaments may measure up to 14,000 nanometers in length, have a uniform diameter of 80 nanometers, and are enveloped in a lipid (fatty) membrane. Each virion contains one molecule of single-stranded, negative-sense RNA. New viral particles are created by budding from the surface of their hosts' cells; however, filovirus replication strategies are not completely understood.



Negative stain image of an isolate of Marburg virus, showing filamentous particles as well as the characteristic "Shepherd's Crook". Magnification approximately 100,000 times. Image courtesy of Russell Regnery, Ph.D., DVRD, NCID, CDC.

### When were the members of the filovirus family first recognized?

The first filovirus was recognized in 1967 when a number of laboratory workers in Germany and Yugoslavia, who were handling tissues from green monkeys, developed hemorrhagic fever. A total of 31 cases and seven deaths were associated with these outbreaks. The virus was named after Marburg, Germany, the site of one of the outbreaks.

After the initial outbreaks, the virus disappeared. It did not reemerge until 1975, when a traveler, most likely exposed in Zimbabwe, became ill in Johannesburg, South Africa. The virus was transmitted there to his traveling companion and a nurse. A few sporadic cases of Marburg hemorrhagic fever have been identified since that time.

Ebola virus was first identified in 1976 when two outbreaks of Ebola hemorrhagic fever (Ebola HF) occurred in northern Zaire (now the Democratic Republic of Congo) and southern Sudan. The outbreaks involved what eventually proved to be two different species of Ebola virus; both were named after the nations in which they were discovered. Both viruses showed themselves to be highly lethal, as 90% of the Zairian cases and 50% of the Sudanese cases resulted in death.

Since 1976, Ebola virus appeared sporadically in Africa, with small to midsize outbreaks confirmed between 1976 and 1979. Large epidemics of Ebola HF occurred in Kikwit, Zaire in 1995 and in Gulu, Uganda in 2000. Smaller outbreaks were identified in Gabon between 1994 and 1996. For information on known Ebola HF cases and outbreaks, please refer to the chronological list.

## **What are the natural hosts of filoviruses?**

It appears that filoviruses are zoonotic, that is, transmitted to humans from ongoing life cycles in animals other than humans. Despite numerous attempts to locate the natural reservoir or reservoirs of Ebola and Marburg viruses, their origins remain undetermined. However, because the virus can be replicated in some species of bats, some types of bats native to the areas where the virus is found may prove to be the viruses' carriers.

## **How are filoviruses spread?**

In an outbreak or isolated case among humans, just how the virus is transmitted from the natural reservoir to a human is unknown. Once a human is infected, however, person-to-person transmission is the means by which further infections occur. Specifically, transmission involves close personal contact between an infected individual or their body fluids, and another person. During recorded outbreaks of hemorrhagic fever caused by filovirus infection, persons who cared for (fed, washed, medicated) or worked very closely with infected individuals were especially at risk of becoming infected themselves. Nosocomial (hospital) transmission through contact with infected body fluids – via reuse of unsterilized syringes, needles, or other medical equipment contaminated with these fluids – has also been an important factor in the spread of disease. When close contact between uninfected and infected persons is minimized, the number of new filovirus infections in humans usually declines. Although in the laboratory the viruses display some capability of infection through small-particle aerosols, airborne spread among humans has not been clearly demonstrated.

During outbreaks, isolation of patients and use of protective clothing and disinfection procedures (together called viral hemorrhagic fever isolation precautions or barrier nursing) has been sufficient to interrupt further transmission of Marburg or Ebola viruses, and thus to control and end the outbreak. Because there is no known effective treatment for the hemorrhagic fevers caused by filoviruses, transmission prevention through application of VHF isolation precautions is currently the centerpiece of filovirus control.

In conjunction with the World Health Organization, CDC has developed practical, hospital-based guidelines, titled: *Infection Control for Viral Haemorrhagic Fevers In the African Health Care Setting*. The manual can help health-care facilities recognize cases and prevent further hospital-based disease transmission using locally available materials and few financial resources.