



© CDC/Dr F. A. Murphy

Ebola virus disease – an introduction

Ebola virus disease – an introduction

Brief description

Ebola virus disease (EVD) is a severe, often fatal illness in humans. EVD outbreaks have a case fatality rate of up to 90%. Ebola first appeared in 1976 in two simultaneous outbreaks, in Nzara, Sudan, and in Yambuku, Democratic Republic of Congo.^{1,2} The latter was in a village situated near the Ebola River, from which the disease takes its name. It has not been reported in humans in the Asia Pacific region as of 31 July 2012. However, with global travel, it is possible that outbreaks in Africa could result in the spread of the virus to Asia.

There are different species of the Ebola virus. Of these, the Reston ebolavirus was first discovered in laboratories in Reston, Virginia, United States of America (USA) in 1989 after some quarantined, crab-eating macaque monkeys originating from the Philippines became ill and died. In 2008, a virus identified in pigs was found to be very similar to the virus identified in monkeys imported into the USA for research from the Philippines in 1989.³

In 2009, six people tested positive for Reston ebolavirus antibodies after contact with sick pigs in the Philippines, but had no significant symptoms. The threat to human health is likely to be low for healthy adults but is unknown for all other population groups. Therefore, the ebola reston virus is not as great a threat as the other ebolaviruses that are known to be highly pathogenic for humans. However, it is of public health concern in the Asia-Pacific region because, although very rare, it is a newly emerging disease in animals and humans.

Currently there is no vaccine or specific treatment for Ebola virus disease.

Geographical distribution

EVD outbreaks occur primarily in remote villages in Central and West Africa, near tropical rainforests. The virus is transmitted to people from wild animals and spreads in the human population through human-to-human transmission.

Since 2008, Reston ebolavirus has been detected during several outbreaks of a deadly disease in pigs in the People's Republic of China and in Philippines, but no illness or death in humans from this species has been reported to date.²

Agent

Ebolavirus belongs to the *Filoviridae* family (filovirus). Ebolavirus comprises 5 distinct species:

1. Bundibugyo ebolavirus (BDBV)
2. Zaire ebolavirus (EBOV)

3. Sudan ebolavirus (SUDV)
4. Reston ebolavirus (RESTV)
5. Taï Forest (formerly Côte d'Ivoire ebolavirus) ebolavirus (TAFV)

Four of the five subtypes occur in an animal host native to Africa. BDBV, EBOV, and SUDV have been associated with large EVD outbreaks in Africa, whereas RESTV and TAFV have not. Pathogenicity varies among Ebola viruses, from EBOV, which is highly lethal in humans, to RESTV, which causes disease in pigs and macaques but asymptomatically infects humans.

Reservoir

Fruit bats of the *Pteropodidae* family are considered to be the natural host of the Ebola virus. Although non-human primates have been a source of infection for humans, they are not thought to be the reservoir but rather an accidental host like human beings. Since 1994, Ebola outbreaks from the EBOV and TAFV species have been observed in chimpanzees and gorillas.

RESTV has caused severe EVD outbreaks in macaque monkeys (*Macaca fascicularis*) farmed in Philippines and detected in monkeys imported into the USA in 1989, 1990 and 1996, and in monkeys imported to Italy from Philippines in 1992.

A recent study suggests that bats might be a reservoir for Ebola virus in Bangladesh. The study found antibodies against Zaire and Reston ebolaviruses circulating in 3.5% of the 276 bats scientists screened in Bangladesh.⁴ Detection of antibodies to Ebola virus infection in Indonesian orangotans suggests the existence of multiple species of filoviruses or unknown filovirus-related viruses in Indonesia, some of which are serologically similar to African ebolaviruses.⁵

Human infection

Risk factors

Human contact with infected fruit bats or monkeys/apes and the consumption of their raw meat leads to wild-life-to-human transmission of the virus.

Human-to-human transmission is through direct or close contact with infected patients, and particularly through contact with blood and body fluids of an infected patient.

Health-care workers caring for patients with suspected or confirmed Ebola are at risk if proper hospital infection control measures are not in place.

Laboratory personnel handling infected material without proper biosafety measures are also at risk.

Mode of transmission

Ebola is introduced into the human population through close contact with the blood, secretions, organs or other bodily fluids of infected animals. In Africa, infection has been documented through the handling of infected chimpanzees, gorillas, fruit bats, monkeys, forest antelope and porcupines found ill or dead or in the rainforest.

Ebola then spreads in the community through human-to-human transmission, with infection resulting from direct contact (through broken skin or mucous membranes) with the blood, secretions, organs or other bodily fluids of infected people, and indirect contact with environments contaminated with such fluids.

Burial ceremonies in which mourners have direct contact with the body of the deceased person can also play a role in the transmission of Ebola.

Health-care workers have frequently been infected while treating patients with suspected or confirmed EVD. This has occurred through close contact with patients when infection control precautions are not strictly practiced.

Among workers in contact with monkeys or pigs infected with Reston ebolavirus, several infections have been documented in people who were clinically asymptomatic. Thus, RESTV appears less capable of causing disease in humans than other Ebola species.

Clinical signs and symptoms

EVD is a severe acute viral illness often characterized by the sudden onset of fever, intense weakness, muscle pain, headache and sore throat. This is followed by vomiting, diarrhoea, rash, impaired kidney and liver function, and in some cases, both internal and external bleeding. Laboratory findings include low white blood cell and platelet counts and elevated liver enzymes.

People are infectious as long as their blood and secretions contain the virus. Men who have recovered from the disease can still transmit the virus through their semen for up to 7 weeks after recovery from illness.²³

Incubation period: 2 to 21 days.

Treatment

Severely ill patients require intensive supportive care. Patients are frequently dehydrated and require oral rehydration with solutions containing electrolytes or intravenous fluids.

No licensed specific treatment is available for use in people or animals.

Prevention and control

There are no vaccines for humans or for animals.

In the absence of effective treatment and a human vaccine, raising awareness of the risk factors for Ebola infection and the protective measures individuals can take is the only way to reduce human infection and death.

Transmission to health-care workers has been reported when appropriate infection control measures have not been observed.

It is not always possible to identify patients with EBV early because initial symptoms may be non-specific. For this reason, it is important that health-care workers apply standard precautions consistently with all patients – regardless of their diagnosis – in all work practices at all times. These include basic hand hygiene, respiratory hygiene, the use of personal protective equipment and safe injection practices.

Samples taken from suspected human and animal Ebola cases for laboratory diagnosis should be handled by trained staff and processed in suitably equipped laboratories.

Individuals

- Suspected animals should be handled with gloves and other appropriate protective clothing.
- Gloves and appropriate personal protective equipment should be worn when taking care of ill patients at home.
- Regular hand washing is required after visiting patients in hospital, as well as after taking care of patients at home.

Community

- Communities affected by Ebola should inform the population about the nature of the disease and about outbreak containment measures, including burial of the dead.
- People who have died from Ebola should be promptly and safely buried.

In regions where RESTV has been reported in pigs:

- Routine cleaning and disinfection of pig or monkey farms (with sodium hypochlorite or other detergents) should be effective in inactivating the virus.
- All animal products (blood, meat and milk) should be thoroughly cooked before eating.
- Educational public health messages should focus on reducing the risk of pig-to-human transmission as a result of unsafe animal husbandry and slaughtering practices, and unsafe consumption of fresh blood, raw milk or animal tissue.

References

- (1) Isaacson, M; Sureau, P; Courteille, G; Pattyn, SR;. Clinical Aspects of Ebola Virus Disease at the Ngaliema Hospital, Kinshasa, Zaire, 1976.
- (2) WHO. Media Centre. Ebola virus disease. Fact sheet N°103. <http://www.who.int/mediacentre/factsheets/fs103/en/>.
- (3) WHO Global Alert and Response. Ebola Reston in pigs and humans in the Philippines – update, www.who.int/csr/don/2009_03_31/en/.
- (4) Olival KJ, Islam A, Yu M, Anthony SJ, Epstein JH, Khan SA, Khan SU, Crameri G, Wang LF, Lipkin WI, Luby SP, Daszak P.; Ebola virus antibodies in fruit bats, Bangladesh. *Emerg Infect Dis*. 2013 Feb;19(2):270-3. doi: 10.3201/eid1902.120524.
- (5) Nidom CA1, Nakayama E, Nidom RV, Alamudi MY, Daulay S, Dharmayanti IN, Dachlan YP, Amin M, Igarashi M, Miyamoto H, Yoshida R, Takada A. Serological evidence of Ebola virus infection in Indonesian orangutans. *PLoS One*. 2012;7(7):e40740. doi: 10.1371/journal.pone.0040740. Epub 2012 Jul 18.



Weblinks with more information:

- <http://www.who.int/mediacentre/factsheets/fs103/en/>
- www.who.int/csr/don/2009_03_31/en/
- www.afro.who.int/en/clusters-a-programmes/dpc/epidemic-a-pandemic-alert-and-response/outbreak-news/4140-ebola-virus-disease-west-africa-situation/
- www.cdc.gov/vhf/ebola/

