Ebola

By: Monica Carbajal

**Etiology:** Ebola is the virus that causes Ebola hemorrhagic fever. It is a member of the Filoviridae (filovirus) family. Its genus is *Ebolavirus* and it consists of five strains; *Bundibugyo ebolavirus*, *Zaire ebolavirus*, *Reston ebolavirus*, *Sudan ebolavirus*, and *Tai Forest ebolavirus* (formally *Cote d'Ivoire ebolavirus*). Four of the five strains cause disease in humans and Reston virus only cause disease in animals. [1] [10]

**Transmission:** WHO [1]
Ebola is transmitted through direct contact between an infected animal to a human. Scientists believe this is how Ebola emerged. Ebola is spread mainly through direct contact between the blood, secretions and bodily fluids of an infected person to another person. Other modes of transmission include exposure to objects (like needles) that have been contaminated with infected secretions and direct contact with the cadaver of an infected human such as in burial ceremonies. [1]

**Reservoirs:** The reservoir of Ebola is unknown but experts believe its zoonotic (animal borne) and bats are likely the reservoir. This is based on current evidence and the nature of similar viruses. Four of the five strains happen in animal hosts that are native to Africa. [10]

**General Characteristics and Tests for Identification/Diagnosis:**
Ebola is a member of the filovirus family which is helical, non-segmented, negative-stranded RNA viruses. [7]
Before diagnosing Ebola, healthcare workers need to rule out other disease such as typhoid fever, malaria, cholera, hepatitis, leptospirosis, etc… [9] There are several laboratory tests used to confirm Ebola. These tests are considered extremely biohazard risk and should be done under maximum biological contamination conditions. Deaths of healthcare workers during outbreaks are due to lack of protective clothing or improper handling of specimens. [5] The laboratory tests performed include an antigen-capture ELIZA test, an antigen detection test, a reverse transcriptase polymerase chain reaction assay (RT-PCR) and virus isolation. [2] [9]

**Signs and Symptoms:**
Symptoms appear two to twenty-one days after exposure. Initial symptoms include diarrhea, fever, headache, muscle pain and vomiting. Severe symptoms follow which consists of hiccups, rash, difficulty breathing, chest pain and internal and external bleeding. [5] [6]

**Historical Information:**
Ebola appeared in 1976 in two outbreaks, one in Sudan and another in the Democratic Republic of Congo where it appeared in a village near the Ebola River and acquired its name. The mortality for the outbreak of Sudan (*Sudan ebolavirus*) was 53% and infected 284. The second outbreak in the Rep. of Congo (*Zaire ebolavirus*) had a mortality rate of 88% and infected 318 people. In 1989 the *Reston ebolavirus* strain was identified in monkeys that were imported from the Philippines into Reston, Virginia and Texas. The last strain, *Tai Forest ebolavirus*, was discovered in the Tai Forest where an ethologist accidentally infected herself during a necropsy on a dead chimpanzee. [1] [12] Sporadic outbreaks have occurred throughout the years in dense forest areas in central Africa like Congo, Uganda and Democratic Republic of Congo. [11]
**Virulence Factors:**
Evidence shows that Ebola virus overthrows the innate and adaptive immune system responses and triggers an inflammatory response so harmful that it causes direct tissue damage. The immune system of the host is overwhelmed with the inflammatory response and cell damage caused by the virus, especially the liver, and this leads to septic shock and death. [8]

**Control/ Treatment:**
Controlling the spread of Ebola is challenging since we know very little about the virus and where it comes from. Lack of knowledge regarding the reservoir makes the public susceptible to acquiring and spreading the virus unknowingly. Also, this virus spreads easily from direct contact between people which make it harder to control. Ebola can also be misdiagnosed in the early stages since early symptoms like fever and headache are common and nonspecific to Ebola. [3]
There is no specific treatment. New drug therapies are being evaluated and some experimental treatments have been effectively tested on animals but not in humans. [3] The only standard treatment given to infected people is supportive therapy. This includes hydrating the patient, treating them for any complicating infections, maintaining their oxygen level status and blood pressure. [5]

**Prevention/ Vaccine:**
Prevention of Ebola is hard since it is unclear how people get infected. If a person is suspected of carrying Ebola, they should be isolated and notify a healthcare professional. [3] Healthcare workers and family who are in close contact with the patient, are at high risk of infection and should use standard isolation precautions or barrier nursing techniques. These include wearing personal protective equipment (goggles, masks, gowns and gloves) when in contact with patient, complete equipment sterilization and routine use of disinfectant. [4] People who have died from Ebola should be properly preserved and any direct contact with the body should be avoided. [1]
There is no vaccine available. Several vaccines are being tested but are not available. [9]

**Local cases:** The only cases of an Ebola outbreak in the U.S have happened in 1989, 1990 and 1996. All the cases involved Reston virus, the only Ebolavirus strain that causes disease in animals and not in humans. The disease was carried by monkeys from the Philippines to facilities in Virginia and Texas without any deaths reported. [11]

**Global Cases/Outbreaks:**
On March 23, 2014 the World Health Organization was notified of an Ebola outbreak in Guinea. A total of 49 cases, including 29 deaths (4 involving healthcare workers) with a mortality rate of 59%, had been reported as of March 22. The cases reported came from Guekedou, Macenta, Nzerekore and Kissidougou districts in Guinea. There were also suspected cases in Liberia and Sierra Leone at the time. [13] A virologic investigation confirmed Zaire ebolavirus as the causative agent. [15] As of May 1st, 2014, there is a cumulative total of 226 clinical cases, including 149 deaths in Guinea with the mortality rate at 90%. Two hundred and ten patients were tested for Ebola and 127 cases have been confirmed by PCR, including 81 deaths. There is also 44 cases are “probably cause for EVD”, 55 cases are “suspected cases” and 25 health care workers were infected, including 16 deaths. There is still seven patients in isolation in Guinea. In Liberia, as of May 2nd the total number of cases was 13 (6 confirmed, 2 probably and 5 suspected), including 11 deaths. There have not been any new cases in this area as of the 6th of
April. [14] The end to this outbreak has not been declared yet and it is expected that the numbers may continue to rise as everyone battles to control the outbreak.

References:


