Journal of Saidu Medical College 2014; 4(1)

EBOLA VIRUS AND EBOLA VIRUS DISEASES

Alamzeb, Aziz Ahmad, Taj Muhammad Khan

The name of the Ebola virus which is making the headlines today originates from the Ebola River in the Congo. The first time the disease appeared was in August 1976. Patient zero was a schoolteacher who had been touring along the Ebola River just days before he was identified with what become known as the Ebola virus. This was the beginning of ebola viral disease which has an average fatality rate of 83%.

Ebola virus (EBOV) is one of five known viruses within the genus Ebolavirus[1]. Four of the five known Ebola viruses, including EBOV, cause a severe and often fatal hemorrhagic fever in humans and other mammals, known as Ebola virus disease (EVD). Ebola virus has caused the majority of human deaths from EVD, and is the cause of the 2013–2014 Ebola virus epidemic in West Africa, which has resulted in at least 9,216 suspected cases and 4,555 confirmed deaths[2]. There are two candidates for host cell entry proteins. The first is a cholesterol transporter protein, the host-encoded Niemann–Pick C1 (NPC1), which appears to be essential for entry of Ebola virions into the host cell and for its ultimate replication[3,4].The second candidate is TIM-1 (aka HAVCR1)[5]. TIM-1 was shown to bind to the receptor binding domain of the EBOV glycoprotein, to increase the receptivity of Vero cells. Silencing its effect with siRNA prevented infection of Vero cells. TIM1 is expressed in tissues known to be seriously impacted by EBOV lysis (trachea, cornea, and conjunctiva). A monoclonal antibody against the IgV domain of TIM-1, ARD5, blocked EBOV binding and infection. Ebola virus is a zoonotic pathogen. Intermediary hosts have been reported to be "various species of fruit bats ... throughout central and sub-Saharan Africa". Evidence of infection in bats has been detected through molecular and serologic means. However, ebolaviruses have not been isolated in bats[6]. End hosts are humans and great apes, infected through bat contact or through other end hosts. Pigs on the Philippine islands have been reported to be infected with Reston virus, so other interim or amplifying hosts may exist [6].Ebola virus [1]. was first identified as a possible new "strain" of Marburg virus in 1976[7,8,9]. At the same time, a third team introduced the name "Ebola virus[3, 4,10]. The International Committee on Taxonomy of Viruses lists Ebola virus as the single member of the species Zaire ebolavirus, which is included into the genus Ebolavirus, family Filoviridae, order Mononegavirales. The name "Ebola virus" is derived from the Ebola River—a river that was at first thought to be in close proximity to the area in Democratic Republic of Congo, previously called Zaire, where the 1976 Zaire Ebola virus outbreak occurred—and the taxonomic suffix virus[1].The prototype Ebola virus, variant Mayinga (EBOV/May), was named for Mayinga N'Seka, a nurse who died during the 1976 Zaire outbreak[1,11,12].

Bats are considered the most likely natural reservoir of ebola virus. Plants, arthropods, and birds have also been considered[13,14,]. In the wild, transmission may occur when infected fruit bats drop partially eaten fruits or fruit pulp, then land mammals such as gorillas and duikers may feed on these fallen fruits. This chain of events forms a possible indirect means of transmission from the natural host species to other animal species, which has led to research into viral shedding in the saliva of fruit bats. Fruit production, animal behavior, and other factors vary at different times and places that may trigger outbreaks among animal populations[15].

Bats were known to reside in the cotton factory in which the first cases of the 1976 and 1979 outbreaks were observed, and they have also been implicated in Marburg virus infections in 1975 and 1980[16]. Of 24 plant species and 19 vertebrate species experimentally inoculated with EBOV, only bats became infected[17]. The bats displayed no clinical signs and is evidence that these bats are a reservoir species of the virus. In a 2002–2003 survey of 1,030 animals including 679 bats from Gabon and the Republic of the Congo, 13 fruit bats were found to contain

EBOV RNA fragments[18]. As of 2005, three types of fruit bats (Hypsignathus monstrosus, Epomops franqueti, and Myonycteris torquata) have been identified as being in contact with EBOV. They are now suspected to represent the EBOV reservoir hosts[19,20]. Antibodies against Zaire and Reston viruses have been found in fruit bats in Bangladesh, thus identifying potential virus hosts and signs of the filoviruses in Asia[21].

Between 1976 and 1998, in 30,000 mammals, birds, reptiles, amphibians and arthropods sampled from outbreak regions, no Ebola virus was detected apart from some genetic traces found in six rodents (Mus setulosus and Praomys) and one shrew (Sylvisorex ollula) collected from the Central African Republic[16,22]. Traces of EBOV were detected in the carcasses of gorillas and chimpanzees during outbreaks in 2001 and 2003, which later became the source of human infections. However, the high lethality from infection in these species makes them unlikely as a natural reservoir[16]. When the diagnosis of EVD is suspected, the travel and work history along with exposure to wildlife are important factors to consider. The diagnosis is confirmed 2isolating the virus, detecting its RNA or proteins, or detecting antibodies against the virus in a person's blood. Isolating the virus by cell culture, detecting the viral RNA by polymerase chain reaction (PCR) and detecting proteins by enzyme-linked immunosorbent assay (ELISA), works best early and in those who have died from the disease. Detecting antibodies against the virus works best late in the disease and in those who recover[23].

During an outbreak, virus isolation is often not feasible. The most common diagnostic methods are therefore real-time PCR and ELISA detection of proteins, which can be performed in field or mobile hospitals[24]. Filovirions can be seen and identified in cell culture by electron microscopy due to their unique filamentous shapes, but electron microscopy cannot tell the difference between the various filoviruses despite there being some length differences[25].

Signs and symptoms

Symptoms usually begin with a sudden influenza-like stage characterized by feeling tired, fever, pain in the muscles and joints, headache, and sore throat. The fever is usually greater than 38.3 °C (100.9 °F). This is often followed by: vomiting, diarrhea and abdominal pain. Shortness of breath and chest pain may occur next along with swelling, headaches and confusion. In about half of cases the skin may develop a maculopapular rash (a flat red area covered with small bumps).

In some cases, internal and external bleeding may occur. This typically begins five to seven days after first symptoms. All people show some decreased blood clotting. Bleeding from mucous membranes or from sites of needle punctures is reported in 40–50% of cases. This may result in the vomiting of blood, coughing up of blood or blood in stool. Bleeding into the skin may create petechiae, purpura, ecchymoses, hematomas (especially around needle injection sites). There may also be bleeding into the whites of the eyes. Heavy bleeding is uncommon and if it occurs is usually within the gastrointestinal tract.

Recovery may begin between 7 and 14 days after the start of symptoms. Death, if it occurs, is typically 6 to 16 days from the start of symptoms and is often due to low blood pressure from fluid loss. In general, the development of bleeding often indicates a worse outcome and this blood loss can result in death. People are often in a coma near the end of life. Those who survive often have ongoing muscle and joint pain, liver inflammation, and decreased hearing among other difficulties.

Prevention

Recommended measures for people caring for those infected with Ebola include the wearing of protective clothing including masks, gloves, gowns, and goggles[26].These same measures are recommended for those who may handle objects contaminated by the infected person's body

fluids[27].The infected person should be barrier-isolation from other people[26]. All equipment, medical waste, patient waste, and surfaces that may have come into contact with body fluids require disinfection[28]. Education on the proper suit-up and removal of personal protective equipment is also required. In Sierra Leone, the typical training period for the use of such safety equipment lasts approximately 12 days[29].

During the 2014 outbreak kits were put together to help familes treat Ebola in their homes which includes protective clothing as well as chlorine powder and other cleaning supplies[30]. Education of those who provide care in these techniques, and the provision of such barrier-separation supplies has been a priority of the Doctors without Borders organization.

Ebola viruses can be eliminated with heat (heating for 30 to 60 minutes at 60 °C or boiling for 5 minutes). To disinfect surfaces, some lipid solvents such as some alcohol-based products, detergents, sodium hypochlorite (bleach) or calcium hypochlorite (bleaching powder), and other suitable disinfectants at appropriate concentrations can be used[31, 32].

Education of the general public of the risk factors for Ebola infection and of the protective measures individuals can take is recommended by the World Health Organization[1]. These measures include avoiding direct contact with infected people and regular hand washing using soap and water[33].

Bushmeat, an important source of protein in the diet of some Africans, should be handled with appropriate protective clothing and thoroughly cooked before consumption[1]. Some research suggests that an outbreak in the wild animals used for consumption may result in a corresponding human outbreak. Since 2003, such animal outbreaks have been monitored with the aim of predicting and preventing Ebola outbreaks in humans[34].

If a person with Ebola dies, direct contact with the body should be avoided[26]. Certain burial rituals, which might have included making any kind of direct contact with a dead body, require reformulation such that they consistently maintain a proper protective barrier between the dead body and the living[35,36]. It is recommended that the bodies of people who have died from Ebola be buried or cremated only with proper care[37].Social anthropologists may help find alternatives to traditional rules for burials[38].

Transportation crews are instructed to follow a certain isolation procedure should anyone exhibit symptoms resembling the Ebola virus disease[39]. The World Health Organization as of Aug 14, 2014 does not consider travel bans to be useful in decreasing spread[40].

In laboratories where diagnostic testing is carried out, biosafety level 4-equivalent containment is required, since ebolaviruses are World Health Organization Risk Group 4 pathogens. Laboratory researchers must be properly trained in BSL-4 practices and wear proper personal protective equipment.

2014 spread outside of Africa

As of 15 October 2014, there have been 17 cases of Ebola treated outside of Africa, four of whom have died[41]. In early October, Teresa Romero, a 44-year-old Spanish nurse, contracted Ebola after caring for a priest who had been repatriated from West Africa. This was the first transmission of the virus to occur outside of Africa[42].On 19 September, Eric Duncan flew from his native Liberia to Texas; five days later he began showing symptoms and visited a hospital, but was sent home. His condition worsened and he returned to the hospital on 28 September, where he passed away on 8 October[43]. Health officials confirmed a diagnosis of Ebola on 30 September-the first case in the United States[44]. On 12 October, the CDC confirmed that a nurse in Texas who had treated Duncan was found to be positive for the Ebola virus, the first known case of the disease to be contracted in the United

States[44]. On 15 October a second Texas healthcare worker was confirmed to have the virus[45]

Medications.

Antivirals

A number of antiviral medications are being studied. Favipiravir, an anti-viral drug approved in Japan for stockpiling against influenza pandemics, appears to be useful in a mouse model of Ebola[46, 47]. On 4 October 2014, it was reported that a French nun who contracted Ebola while volunteering in Liberia was cured with Favipiravir treatment[48].BCX4430 is a broad-spectrum small molecule antiviral drug developed by BioCryst Pharmaceuticals and undergoing animal testing as a potential human treatment for Ebola by USAMRIID[49]. The drug has been approved to progress to Phase 1 trials, expected late in 2014[50].

Blood products

The WHO has stated that transfusion of whole blood or purified serum from Ebola survivors is the therapy with the greatest potential to be implemented immediately, although there is little information as to its efficacy[51]. September 2014, WHO issued an interim guideline for this therapy[52].

Vaccine

As of September 2014, no vaccine was approved by the United States Food and Drug Administration (FDA) for clinical use in humans[53,54].

Is Pakistan ready for MERS virus and ebola virus threat ?

SLAMABAD- World Health Organization has warned today that Ebola virus might spread to Pakistan sooner or later.

Speaking to British media, WHO Representative in Pakistan Dr Michel Thieren said that since Ebola virus was spreading faster across the world, Pakistan was also at a high risk of it. He suggested Pakistan government to take speedy precautionary measures and steps against the deadly disease.

According to Dr Michel, international passengers can carry the virus anywhere they travel. Michel stated that no measures at the airport can be taken to prevent the virus from spreading in the country. Enhanced screening for Ebola can be introduced at airports though. Therefore, government can't be held responsible for it.

However, raising awareness about the possible indications of the virus amongst the masses and the security officials at the airport can be the most effective way to defend against Ebola.

Earlier, the Ministry of National Health on Wednesday prepared an emergency plan to deal with the Ebola virus; as per which, the incoming passengers from African countries will be screened and medical personnel will be trained.

According to the details, a high level meeting to discuss how to deal with the deadly Ebola virus took place in Islamabad: The meeting approved creation of 'Ebola counters' at the airports, temporary clinics and special wards in the hospitals.

It was also decided that the Pakistan army personnel arriving from the peace keeping mission would be monitored for twenty one days. The provincial governments had also been directed to arrange screening and monitoring of passengers coming from African countries. World Health Organization's (WHO) Dr Michel has already termed Ebola virus a big threat and recommended training of medical staff. As per WHO, there are no Ebola affected patients in Pakistan right now, however, if even a single affected patient entered in country without screening can cause the outbreak.The Nation. Monday, 20 October, 2014

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CORRESPONDENCE ADDRESS:
Dr. Alamzeb
House # 3, Saidu Medical College
Saidu Sharif, Swat.
Cell: 0334-8373737
Email: dralamzebsmc58@yahoo.com