PUBLIC HEALTH

Ebola erupts again

Epidemiology: The current outbreak of Ebola hemorrhagic fever in Uganda marks the 16th recognized time the virus has erupted since its discovery in 1976 (Table 1).[1,2] Each outbreak nudges us closer to understanding the savage nature of this virus and its effect on primates. From the first devastating epidemics in Zaire and Sudan we learned that acutely ill patients are intensely viremic,[2] that patient-isolation supplies and barrier-nursing techniques save lives[3] and that the disease's name is misleading because hemorrhage occurs in less than 50% of cases.[4] However, 25 years later we still don't know the identity of the natural reservoir of the virus, the significance of elevated IgG antibodies after infection or the function of circulating glycoprotein seen during the acute phase of infection.[5]

The Ebola virus has 4 subtypes: Zaire, Sudan, Ivory Coast and Reston.[2] Reston, the strain that caused the outbreaks among monkeys imported from the Philippines to the United States in the early 1990s, is distinguished by its apparent non-African origin and by its lesser pathogenicity in humans.[2] Monkeys appear susceptible hosts for all 4 subtypes but are not likely the primary reservoir, because they become ill and die rapidly when infected, much like humans.[2] The experimental inoculation of an arbitrary list of animals demonstrated that certain species of bats are able to support replication and circulation of high levels of the virus without contracting the disease.[6] The search continues for a hypothesis to explain this observation.

Table 1: Outbreaks of Ebola hemorrhagic fever

Year	Country	No. of human cases
1976	Zaire*	318
	Sudan	284
	England	1
1977	Zaire	1
1979	Sudan	34
1989	Philippines	0
	United States	0
1992	Italy	0
1994	Gabon	44
	Ivory Coast	1
1995	Zaire	315
1996	Gabon	37
	South Africa	2
	United States	0
	Philippines	0
2000	Uganda	428†

*Currently the Democratic Republic of the Congo.
†As of Jan. 16, 2001. Source: Health Canada.[1]

Transmission is through contact with blood or body fluids from infected patients or monkeys.[1,2,5] Large quantities of the virus are present in the dermal tissue of infected people; the virus most likely enters the body through contact of contaminated fingers with oral mucosa or conjunctiva. The virus has been isolated in semen and vaginal secretions, so transmission may also occur through sexual activity and during pregnancy.[5] Close contacts, family members and caregivers are at high risk; 30% of physicians who provided care during the 1995 outbreak in Kikwit, Democratic Republic of the Congo, contracted the disease.[5]

The virus targets endothelial cells, macrophages, monocytes and hepatocytes. It causes focal necrosis of the liver, lymphoid organs, kidneys, testes and ovaries. During the acute phase the virus activates multiple cytokines implicated in the pathogenesis of vascular permeability and shock, and it produces a circulating, soluble glycoprotein that has been speculated to interfere with immune response.[2,5]

Clinical management: After an incubation period of 4–20 days, patients present with nonspecific symptoms (fever, conjunctivitis, muscle pain, headache, bloody diarrhea, sore throat) that are easily mistaken for shigellosis, typhoid fever or malaria.[2,7] This initial phase is quickly followed by vomiting, rash, decreased kidney and liver function and possibly bleeding (epistaxis, hematemesis, melena, petechiae, oozing from puncture sites).

Excellent tests for rapidly identifying viral nucleic acids, proteins and antibodies have been developed.[8] In the epidemics to date, however, these tests have mostly been unavailable on site, since few African laboratories are capable of accessing and utilizing them.[8]

There is no specific treatment for Ebola hemorrhagic fever, although efforts are under way to develop drugs such as mRNA cap methyltransferase inhibitors, which might help to halt transmission.[8] Treatment is supportive. In general, patients die 6 to 9 weeks after the onset of symptoms.[2] In the past, case-fatality rates have exceeded 50% and have reached 90%.[1] The current outbreak in Uganda is remarkable for its relatively low case-fatality rate of 40%.

Prevention: We don't know where Ebola comes from or how the first human case in any outbreak occurs. This makes primary prevention difficult. Secondary prevention depends on early detection and control. Strategies to facilitate this include continued support for the improvement of basic public health standards in developing countries, international preparedness for a coordinated response when Ebola infection erupts, improved rapidity of diagnosis by the provision of effective, rapid tests on site and continued research on the reservoir, virology and treatment of Ebola hemorrhagic fever.[8] — *Erica Weir*, CMAJ

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