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Threat of Hepatitis E Virus Infection in Somalia During Operation Restore Hope

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In support of Operation Restore Hope, the United States military established a diagnostic laboratory for infectious diseases, the Joint Forward Laboratory, in Mogadishu, Somalia. Because sporadic hepatitis due to unknown causes was a frequent problem, staff members of the Joint Forward Laboratory evaluated 31 Somalis, five displaced Ethiopians, and three Western relief workers who had acute clinical hepatitis. Patients lived in multiple locations in Somalia—Mogadishu, Baidoa, and Merca—and became ill between December 1992 and February 1993. IgM antibody to hepatitis A virus was found in one English relief worker, and IgM antibody to hepatitis E virus was found in 20 (65%) of 31 Somalis, two (40%) of five Ethiopians, and two (67%) of three Western relief workers. No patient had evidence of acute hepatitis B, malaria, yellow fever, or other arbovirus infections. These data indicate that hepatitis E virus—the major cause of enterically transmitted non-A, non-B hepatitis—was a common cause of acute sporadic hepatitis in Somalia during the initial stages of Operation Restore Hope.

Somalia has recently been the center of a massive humanitarian relief effort. A major part of the relief effort has come in the form of medical aid because of the breakdown of medical care and the high rates of mortality due to preventable infectious diseases [1]. To assist in the humanitarian relief effort, military troops from more than 20 countries were deployed to Somalia on 9 December 1992 by the United Nations in an operation called Operation Restore Hope. In support of Operation Restore Hope, the United States military established a diagnostic laboratory for infectious diseases, the Joint Forward Laboratory, in Mogadishu, Somalia. The Joint Forward Laboratory was responsible for on-site diagnosis of infectious diseases in deployed military personnel and assisted in the diagnosis of illnesses in Somali patients and civilian relief workers.

Because acute hepatitis was a frequent problem among both native Somalis and relief workers and because of the recent outbreak of yellow fever in northern Kenya [2], patients with acute clinical hepatitis who were accessible to personnel in the Joint Forward Laboratory were evaluated

between December 1992 and February 1993. All evaluated patients had aminotransferase levels greater than 2.5 times the upper limit of normal.

Serum samples were obtained and epidemiologic data were collected for 31 Somali and five Ethiopian patients with acute hepatitis (age range, 7–90 years; 75% male; no pregnant females). Somali patients were long-term inhabitants of six different neighborhoods in Mogadishu and two locations around Baidoa, Somalia; the displaced Ethiopians were all living in the Hodon district of Mogadishu. Somali and Ethiopian patients obtained their drinking water from multiple separate wells and reservoirs in the two cities; their food was obtained from relief agencies and street vendors, who acquired their supplies from local farms and nomadic herders.

Patients evaluated for hepatitis E virus (HEV) infection in January 1993 included local inhabitants as well as two French relief workers living in Merca (55 km south of Mogadishu) and one English relief worker living in Mogadishu. All patients presented with acute hepatitis. All three Western relief workers had worked in Somalia for at least 4 months; during this period they had obtained food from local merchants and had drunk untreated well water. Last, two male United States military personnel who had not gone ashore in Somalia but had been stationed just offshore (aboard ship) for 1 month were evaluated because of acute hepatitis. Troops from the United States obtained potable water from reverse-osmosis units and distillation units; they drank bottled water produced in nearby countries and ate food that was shipped directly from the United States.

All serum samples were tested by ELISA for IgM antibody to hepatitis A virus and IgM antibody to hepatitis B core antigen (Abbott Laboratories, Abbott Park, IL). In addition,

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Table 1. Evaluation by ELISA of sera from 41 patients presenting with acute clinical jaundice for IgM antibody to hepatitis A virus, IgM antibody to hepatitis B core antigen, and IgM and IgG antibody to hepatitis E virus.

Patients	No. of patients evaluated	No. (%) of patients with antibody			
		IgM to HAV	IgM to HB _c Ag	IgM to HEV	IgG to HEV
Native Somalis	31	0 . . .	0 . . .	20 (65)	22 (71)
Displaced Ethiopians	5	0 . . .	0 . . .	2 (40)	3 (60)
Western relief workers	3	1 (33)	0 . . .	2 (67)	2 (67)
United States shipboard personnel	2	0 . . .	1 (50)	0 . . .	0 . . .

NOTE. HAV = hepatitis A virus; HB_c Ag = hepatitis B core antigen; HEV = hepatitis E virus.

sera were initially tested in Somalia for IgM antibody to HEV with use of a previously described western blot assay [3] that detects antibody to recombinant Burma ORF2 protein. All sera were retested in the United States for IgM and IgG antibody to HEV with use of an ELISA kit provided by Genelabs Technologies (San Antonio, TX) for research purposes. The kit was provided by cooperative agreement [4]. The ELISA for antibody to HEV contained ORF2 and ORF3 recombinant proteins; ORF2 was derived from Mexico HEV, and ORF3 was derived from Burma HEV. Each patient was also evaluated for malaria, and serum samples were tested by IgM capture ELISA for antibody to yellow fever, dengue, Rift Valley fever, Sindbis, and sandfly fever viruses [5].

One English relief worker living in Mogadishu had IgM antibody to hepatitis A virus, and this worker's condition was diagnosed as acute hepatitis A. One of two American shipboard personnel, both of whom had been stationed in Southeast Asia during the prior 6 months, had IgM antibody to hepatitis B core antigen, and this person's condition was diagnosed as acute hepatitis B. The sera of the two French relief workers and 14 of the 36 Somalis and displaced Ethiopians (11 patients were from Mogadishu and three were from Baidoa) who were evaluated had IgM antibody to HEV by western blot and ELISA. The sera of eight additional Somali patients were positive by ELISA for IgM antibody to HEV, and the sera of another three Ethiopians were positive for IgG antibody to HEV only. Thus, 22 (61%) of 36 Somalis and Ethiopians who were evaluated had IgM antibodies to HEV (table 1).

Despite recent outbreaks of yellow fever in the northern areas of Kenya that border Somalia and anecdotal reports of acute jaundice with hemorrhagic symptoms in Baidoa, none of the serum samples from Somalis, Ethiopians, or relief workers was positive for IgM antibody to yellow fever virus. In addition, none of the patients had evidence of acute infection by other arboviruses or malaria.

The data presented in this report suggest that HEV—the major cause of enterically transmitted non-A, non-B hepati-

tis—was a common cause of acute sporadic hepatitis in Somalia during the initial stage of Operation Restore Hope. Similar to hepatitis A virus, HEV is transmitted by the fecal-oral route and can be widely and rapidly spread when there is a breakdown in sanitation, as occurred in Somalia [6, 7].

In 1985 and 1986, HEV was the cause of an outbreak of acute hepatitis among refugees and foreign relief workers in a refugee camp in Somalia [8]. In contrast with this outbreak, the outbreak of acute hepatitis E described in the present report occurred in multiple, separate locations; this finding suggests that HEV is not just a cause of epidemic disease but that it is endemic in Somalia and a common cause of acute sporadic hepatitis. Studies conducted in nearby Sudan, Ethiopia, and Egypt also indicate that HEV is a common cause of sporadic hepatitis in these regions [3, 9, 10].

Control of HEV transmission in Somalia will require basic improvements in sanitation; in particular, uncontaminated or treated drinking water will have to be provided. Prevention of the spread of HEV is very important because this infectious disease is a cause of increased mortality, especially among pregnant women [11]. Foreign aid workers are also at risk of HEV infection, which should be considered in the differential diagnosis for travelers to this region who develop acute jaundice (even if it develops after the traveler has returned to his or her home country) [12].

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