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Haemorrhagic fever in Gabon. I. Incidence of Lassa, Ebola and Marburg viruses in Haut-Ogooué

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Summary

A serological enquiry aimed at determining the incidence of infection with Lassa, Ebola and Marburg viruses was conducted on the human population of the region of Haut-Ogooué (Gabon) and on primates.

The results, obtained by the indirect immunofluorescence technique, showed that more than 6% of the human population had had contact with Ebola virus but no antibodies against Marburg or Lassa viruses were found.

Most sera reacted to an Ebola antigen from a Zairian strain, but showed little or no reaction to an antigen from a Sudanese strain.

Introduction

The severity of Lassa, Ebola and Marburg virus outbreaks in the recent past, their potential for infection and the difficulties in treating the resulting illness make the pathological action of these viruses an urgent problem for the Public Health Services of Tropical Africa (BRES, 1978).

In the framework of the research which we carry out at the Centre International de Recherches Médicales de Franceville (CIRMF) we have, in collaboration with the Institute Pasteur de Bangui, undertaken a serological inquiry aimed at determining the incidence of infection with these viruses in the human population in the Franceville area and in the primates of the CIRMF colony.

There is a double interest in this study: one epidemiological, concerned with possible propagation of these agents, and the other public health, concerned with study of direct transmission from mother to infant and with possible infection of the foetus.

Material and Methods

Samples

Samples were taken from man and primates as follows:

(a) *Human sera*: 197 serum samples from adults were provided by the Service de Médecine du Travail; 28 serum samples from mothers and 28 from their newborn infants (umbilical cord) were collected at the Clinique du Lac.

All these samples were collected between February 13th and March 19th 1980.

(b) *Primate sera*: 34 early serum and 14 late serum samples were collected from chimpanzees of the CIRMF colony.

Viral antigens

The inactive viral antigens, fixed on slides for immunofluorescence, were sent to us by the C.D.C., Atlanta, Georgia, USA.

Method

The technique of indirect immunofluorescence, described by WULFF & LANGE (1975), was used to search for antibodies against the Lassa, Ebola and Marburg viruses. After fixation by acetone, viral antigens were rinsed with PBS (ph 7·2) and exposed to serum samples; evidence of affinity was achieved by the use of fluorescein conjugated anti-immunoglobulin prepared against whole human or primate serum (Institute Pasteur, ref. 7455 for human serum and CAPPEL lab. for primates). Readings were taken with a fluorescence microscope POLYVAR (Reichert).

Screening with polyvalent slides (a mixture of the three antigens) allowed the identificaton of positive serum samples which were subsequently tested on monovalent slides against each antigen. Two different antigens against Ebola virus were used, one from a

Table I—Human serum reciprocal of antibodies against Ebola antigen Zaire strain and Sudan strain

No. of serum sample	Ebola Antigen	
	Zaire No. 802850	Sudan No. 802681
93	512	≥64
11	32	< 4
23	16	16
33	32	≥16
35	32	< 4
48	1024	< 4
152	4	< 4
153	128	< 4
155	8	< 4
203 mother	1024	< 4
204 umbilical cord	512	< 4
207 mother	16	16
249	1024	< 4
251	16	< 4
259	256	< 4
272	16	< 4
274	64	< 4
279	16	16
292	8	< 4

(Homologous titres: Zaire strain = 256; Sudan strain = 128)

strain isolated in Zaire (No. 802850) and the other from a strain isolated in Sudan (No. 802681).

Results

Human samples

Of the 253 human serum samples tested, none showed the presence of antibodies against Lassa or Marburg virus. In contrast, 19 serum samples, including one mother-infant pair, were positive against Ebola virus.

The results against both strains of Ebola virus are shown in Table I. It shows that 16 samples, that is 6·3% of the population examined, produced antibody titres higher than 1:16. The majority of samples produced antibodies against the Zaire strain and almost none against the Sudan strain.

Transmission from mother to infant was observed only once in a stillborn baby.

Primate samples

All primate serum samples were found to be negative.

Conclusion

The analysis of human serum by immunofluorescence against antigens of Lassa, Ebola and Marburg viruses shows that 6·3% possess antibodies against Ebola at a titre ⩾ 1/16. These results confirm that this virus is widespread in Central Africa (GONZALES *et al.*, 1980; LANGUILLAT *et al.*, 1980; SALUZZO *et al.*, 1980a, b). It should be remembered that it was responsible for epidemics in Sudan and Zaire in 1976 with high mortality rates both in the population and among hospital staff (BRES, 1978).

Thus it was of interest to test the sera against a strain from Zaire and a strain from Sudan. The vast majority of positive sera reacted more strongly against the Ebola antigen from Zaire, which confirms the observations of different authors on the antigenic differences of the Zairian and Sudanese strains.

The transmission of antibodies between mother and infant was found only once. The infant was stillborn and we could not perform a search for IgM because no sample was collected.

These results emphasize the potential risk of outbreaks of Ebola virus in this region and we plan to develop our research both with man and animals with the aim of improving our understanding of its mode of transmission and host vector.

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