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LETTERS TO THE EDITOR

Clinical-scientific notes

Antibodies to Australian bat lyssavirus in an asymptomatic bat carer

The recent fatal case of Australian bat lyssavirus (ABLV) in an 8-year-old boy in February 2013¹ as well as infections in horses in May 2013² has prompted us to write about an earlier non-fatal exposure.

In August 1996, soon after the discovery of ABLV,³ a serological survey of 14 bat carers in Townsville, North Queensland, detected antibodies (rapid fluorescent focus inhibition test (RFFIT) 0.48 international units (IU)/mL) in a 40-year-old male. As a volunteer bat carer for 10 years, mainly of black flying foxes (*Pteropus alecto*) and little red flying foxes (*Pteropus scapulatus*), he had received multiple bites and scratches. He had never received rabies vaccine or rabies immunoglobulin. He did not care for other Australian wildlife and had not visited rabies endemic countries.

A second blood sample was collected 4 months later and tested in parallel with the original sample using both the RFFIT and a commercial rabies antibody enzyme-linked immunosorbent assay (ELISA) (Platella, Sanofi Diagnostics Pasteur, Marnes-la-Coquette, France). The RFFIT is a virus neutralisation test using classical rabies virus that measures the level of neutralising antibody as a ratio to a World Health Organization international standard serum converted to IU per millilitre.⁴ In run 2, the titre rose from a very low antibody level: RFFIT 0.15 IU/mL to 0.42 IU/mL, and ELISA 0.1 to 0.7 EU/mL (Table 1). We interpret the rise in titre as evidence of recent infection with ABLV. The level of neutralisation obtained in runs 2 and 3 for the initial sample was not the same as for run 1 and may represent interassay variability. The RFFIT at the Australian Animal Health Laboratory has a between-assay uncertainty of about ± 0.16 IU/mL at a level of 0.5 IU/mL and a lower

Table 1 Rabies serology test results for virus neutralisation (RFFIT) and ELISA. Serological tests were repeated in batches (when specimens were available) to confirm previous results (runs 1–4)

Date of bleed	RFFIT (IU/mL)†				ELISA (EU/mL)‡
	Run 1	Run 2	Run 3	Run 4	
Specimen 1 (1 August 1996)	0.48	0.1	0.15	<0.3	0.1
Specimen 2 (1 December 1996)	–§	0.44	0.42	0.37	0.7
Specimen 3 (21 February 1997)	–	–	–	11.2	10.7

†RFFIT results are expressed as international units per millilitre relative to the World Health Organization standard rabies serum. ‡ELISA results are expressed as EU/mL relative to a calibration standard included in the kit. §Specimen not collected at this stage. ¶The high levels of antibody in the bleed of 21 February 1997 are due to a series of human diploid cell rabies vaccinations given after the second serology test. ELISA, enzyme-linked immunosorbent assay; EU, equivalent unit; IU, international units.

within-assay uncertainty at about ± 0.08 IU/mL at 0.5 IU/mL. On this basis, we are confident of a rising titre between the samples collected in August and December 1996 and tested in parallel. The consistency between the subsequent three runs and the ELISA supports the interpretation of seroconversion from an initial low level.

Neurological clinical assessment found no abnormalities, electroencephalogram and magnetic resonance imaging were normal, and neuropsychometric studies were normal. Cerebrospinal fluid was not collected. The man was subsequently vaccinated with human diploid cell rabies vaccine, and several months later his rabies serology tests demonstrated high antibody levels (RFFIT, 11.2 IU/mL and ELISA, 10.7 IU/mL). He remains asymptomatic 17 years after his initial test.

What are the possible explanations for these positive titres? Abortive infection with ABLV is difficult to demonstrate in this case and runs against the dogmas of lyssavirus pathogenesis, but should not be dismissed. Abortive rabies infection associated with rabies virus has been described previously in North America in raccoon hunters, fox trappers, veterinary college staff and

students, and speleologists.^{5–7} ABLV has caused abortive infections in dogs, cats and bats.⁸ Confirmation of positive titres using two tests (RFFIT and ELISA) adds more weight to the results being a true positive. However, could positive titres occur without infection and only as a sequel to inoculation of ABLV antigen?

This could be a case of abortive infection with ABLV, but the evidence is weak. However, because the topic is of importance, additional serological studies of people who have physical contact with bats in Australia are justified.

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