The One Health Triad

Optimising health for all

James Watson | Veterinary Investigation Leader
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Emerging and Reemerging infections - 70% vector-borne or zoonotic

http://www.onehealthinitiative.com/map.php
Think “One Health”

• Where animals are farmed to meet the needs of society, an informed society will have a legitimate expectation that the husbandry of these animals will not result in a health threat to people.

• There is a need to develop approaches to public-private cooperation that will allow for effective surveillance of such animal populations for early detection of an emerging health threat. (Managing the Human Animal Interface)
Rabies

Rabies Kills! Prevent Rabies!

- Take animals to get vaccinated.
- Avoid dog bites.
- Wash bite wounds with soap and water.

Get medical care immediately after a bite.

www.rabiesalliance.org
Abdallah ibn al-Fadl, Iraq, A.D.1224
Lyssavirus Diversity
Some Rabies cases “imported” into Australia

Rabies. A second Australian case, with a long incubation period.
Grattan-Smith PJ et al
Abstract
The description of a second case of rabies in Australia, stressing the clinical features and that long incubation periods are possible.
CLINICAL FEATURES:
A 10-year-old Vietnamese girl presented with fever, shoulder pain, subcutaneous emphysema, swallowing difficulty and agitation. After a period of maniacal behaviour all peripheral and central nervous system function was lost.
INTERVENTION AND OUTCOME:
Despite maximal intensive care, the patient died. The diagnosis of rabies was made at autopsy
Encephalitis Caused by a Lyssavirus in Fruit Bats in Australia

Graeme C. Fraser*, Peter T. Hooper†, Ross A. Lunt†, Allan R. Gould†, Laurence J. Gleeson†, Alex D. Hyatt†, Gail M. Russell†, and Jaqueline A. Kattenbelt†

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Suggested citation for this article

Abstract

This report describes the first pathologic and immunohistochemical recognition in Australia of a rabies-like disease in a native mammal, a fruit bat, the black flying fox (Pteropus alecto). A virus with close serologic and genetic relationships to members of the Lyssavirus genus of the family Rhabdoviridae was isolated in mice from the tissue homogenates of a sick juvenile animal.
A HUMAN CASE OF ENCEPHALITIS DUE TO A LYSSAVIRUS RECENTLY IDENTIFIED IN FRUIT BATS

Anthony Allworth, Keith Murray and John Morgan

This is a report of the first known human case of illness apparently due to the newly identified lyssavirus. The lyssavirus had previously only been identified in fruit bats (flying foxes).

A 30-year-old female living in Rockhampton became unwell in late October 1996 with pain and numbness in her left arm. She had been caring for a number of fruit bats for results to the first. Magnetic resonance imaging of the brain revealed several small areas of increased signal on T2 weighted images in the brain stem but was otherwise unremarkable. By day 11 she was anerobic, unresponsive, hypothermic (39°C) and ventilator dependent. An electroencephalogram was consistent with a diffuse encephalitis. Serum and cerebrospinal fluid were sent to the CSIRO.

Notable cases

Australian bat lyssavirus infection: a second human case, with a long incubation period

Jeffrey N Hanna, Ian K Carney, Greg A Smith, Joseph E Deverill, John A Botha, Ina L Serafin, Bruce J Harrower, Peter F Fitzpatrick and Jeffrey W Searle


In December 1998, a 37-year-old Queensland woman died from a rabies-like illness, 27 months after being bitten by a flying fox (fruit bat). Molecular techniques enabled diagnosis of infection with Australian bat lyssavirus (ABL), the second human case to be recognised and the first to be acquired from a flying fox. It must be assumed that any bat in Australia could transmit ABL; anyone bitten or scratched by a bat should immediately wash the wounds thoroughly with soap and water and promptly seek medical advice.

Yellow-bellied sheathtail bat; 4 weeks after bite
Australian Bat Lyssavirus in a Child: The First Reported Case

**abstract**

Human infection with Australian Bat Lyssavirus is extremely rare and has not previously been reported in a child. We describe a fatal case of Australian Bat Lyssavirus in an 8-year-old child, and review the literature pertaining to the diagnosis and management of lyssavirus infection with consideration of its applicability to this emerging strain. *Pediatrics* 2014;133:e1–e5

An 8-year-old boy from a regional island with a large fruit bat colony presented to hospital ~8 weeks after an unwitnessed scratch from a bat on his left forearm, an incident recollected by his sister only in the context of his illness. He presented with a 2-day history of fever, anorexia, and progressively worsening abdominal pain. Lipase was mildly elevated (560 IU/L) and a presumptive diagnosis of acute pancreatitis was made.
Two Qld horses test positive for ABLV

May 2013
Hendra
Hendra Virus History

• Hendra virus was discovered following an outbreak of illness in a racing stable in the suburb of Hendra, Brisbane in 1994
• Virus spreads from bats to horses, then to people
• Single occurrence of exposure in a dog in 2011 (first recorded case as assessed by serology)
• No evidence of naturally occurring spread to other species
• Since then, more than 50 horses have been infected and have either died or been euthanised
• Seven confirmed cases in humans, all in Queensland.
• Four of these died, the most recent in 2009
The Henipaviruses

- Hendra virus and Nipah virus are highly pathogenic paramyxoviruses
- Cause of serious disease outbreaks in humans and livestock in Australia, Malaysia, Singapore, Bangladesh and India
- Natural hosts – Pteropid or Old World Fruit bats, commonly referred to as flying foxes
- Unique among the Paramyxoviridae, classified into the new genus Henipavirus, together with Cedar virus
Henipaviruses

Designated a new genus in the Sub-family *Paramyxovirinae*
Geographical range of the genus *Pteropus*, and henipavirus detections
Influenza
Influenza

Transmission of influenza A(H1N1) 2009 pandemic viruses in Australian swine

Yi-Mo Deng,⁎ Pina Iannello,⁎ Ina Smith,⁎ James Watson,⁎ Ian G. Barr,⁎,̊ Peter Daniels,⁎ Naomi Komadina,⁎ Bruce Harrower,⁎⁎ Frank Y. K. Wong⁎

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Divergent Human-Origin Influenza Viruses Detected in Australian Swine Populations

Frank Y. K. Wong, Celeste Donato, Yi-Mo Deng, Don Teng, Naomi Komadina, Chantal Baas, Joyanta Modak, Mark O’Dea, David W. Smith, Paul V. Effler, Julie Cooke, Kelly R. Davies, Aaron Hurt, Nina Kung, Avram Levy, Richmond Loh, Songhua Shan, Mustaghfira W. Shinwari, Vittoria Stevens, Joanne Taylor, David T. Williams, James Watson, Debbie Eagles, Sam McCullough, Ian G. Barr, Vijaykishna Dhanasekaran

![Diagram showing genetic diversity and evolution of influenza viruses]
Arboviruses
AMR

Drug resistant bacteria can spread to the environment

...and to food
Conclusions
How do we do better?
Thank you

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