Australian Encephalitis in the NT

Peter Whelan and Jim Burrow, Department of Health and Community Services, Darwin

Australian Encephalitis (AE) is an arboviral (i.e arthropod borne or in this case more specifically mosquito borne) disease caused predominantly by Murray Valley Encephalitis virus and occasionally by Kunjin virus. The disease was initially recognised as occurring in epidemics chiefly centred about the Murray-Darling system, but now is known to occur Australia-wide. The last major epidemic was in 1974; 58 people were affected, including five from the Northern Territory (NT).

Since the 1950's evidence has accumulated indicating that in contrast to the epidemic situation in southern Australia, AE is endemic in the Top End of the NT, the Kimberley region of Western Australia, and possibly in North Queensland. Small outbreaks of disease occurring every couple of years are seen in these regions.

From 1974-1993 there have been 18 documented AE cases in the NT of which ten originated from areas from Katherine northward. The disease has been reported throughout the Top End of the NT (Lajamanu, Katherine, Beswick, Belyuen, South Alligator River, Maningrida, Groote Eylandt). All areas north of Tennant Creek are considered risk areas for acquiring AE in most years, with the risk area expanded to include the whole of the NT following widespread and extended wet season rains.

AE is seasonal, occurring mainly in the first half of the year, especially in the months March to May, with cases having occurred from February to July (see Table 1 and Table 2). Young children (under four years) seem particularly vulnerable but adults of all ages have been reported. Aboriginals are over-represented which probably reflects exposure to the vector rather than increased susceptibility. In children the usual presentation is high fever (40°C) with seizures. In contrast, seizures are unusual in adults. The more common adult presentation is fever, headache and confusion. Clinical pointers to AE are tremor, cranial nerve palsy and a syndrome resembling acute poliomyelitis.

Treatment is purely supportive with special attention to respiratory function as central hypoventilation may occur in an otherwise mildly ill patient. The fever abates over a week; most patients are hospitalised for at least three weeks. The diagnosis is confirmed by a fourfold increase in IgG antibodies to MVE virus between paired sera and in the acute phase of the illness a presumptive diagnosis is made by demonstrating specific IgM antibodies to MVE on sera or cerebrospinal fluid.

AE is a serious neurological illness with a mortality in hospitalized cases of 20% (7/36) and occurring in another 25%. About 40% apparently make a complete recovery, however this is not certain as long term cognitive follow-up of the young children affected has not been done.

The viruses of AE are enzootic in a large number of birds and possibly some mammals in northern Australia. The virus is transmitted to animals by the common banded mosquito *(Culex annulirostris)*. The peak transmission time is toward the end of and just after the wet season. During this time the mosquito vector numbers increase markedly from temporarily flooded wet season breeding sites, and later from the more year-round sites as the wet season flooded areas including flood plains, billabongs and creek systems begin to recede. In arid and semi arid areas, this species can reach very high numbers soon after widespread flooding leaves extensive areas of standing water. Transmission of the viruses to humans depends on the interaction of a number of factors, including the presence of the virus in an area, amplification of the virus in host animals (probably birds), the numbers of vector mosquitoes, and the degree of exposure and the immune status of the human population. The timing of flooding of the habitats and hence the occurrence of large numbers of vector mosquitoes, together with the breeding patterns of the natural hosts (probably birds) presumably accounts for the seasonal and year to year variation of AE.

Information from sentinel animals (chickens) suggests that the virus can possibly be transmitted from December to October from Darwin to at least as far south as Katherine (Table 3) but the main risk period for the NT is probably from January to July. No human cases have been reported from the urban areas of Darwin, although sentinel chicken data suggests that there is a possibility near the areas adjacent to Leanyer Swamp (Table 3). The vector mosquito *Cx annulirostris* is predominantly a night biting mosquito with a time of peak biting activity in the first two hours after sundown.

Artificial habitats such as sewerage ponds, storm drains and dams can also be sources of *Cx annulirostris* and have been implicated in human disease in several instances. This highlights the importance of good engineering and high standards of maintenance of public works.

As there is no effective treatment for AE, avoidance of mosquito bites is paramount in prevention. People are advised to:

- use mosquito proof accommodation (houses and screened tents)
- wear protective clothing including long sleeve shirts and trousers between dusk and dawn
- use a protective repellent containing DEET on exposed skin at night
- avoid being outdoors between dusk and dawn and particularly for one to three hours after sundown as this is the preferred feeding time of *Cx annulirostris*
- ensure children are protected from bites
- where possible avoid specific locations with high mosquito activity during the risk months.

It is unlikely that a vaccine will be available in the fotseeable future.

TABLE 1. LOCATION OF CASES WITH MVE 1974 - 1993

YEAR	MONTH OF ONSET	LOCATION	NUMBER
1974	Feb	Tennant Creek	1
	March	Alice springs	2
	March	Katherine	1
	April	Barkly Area	1
1981	March	Groote Eylandt	1
1987	July	Belyuen (near Darwin)	1
1988	March, May	Maningrida (Arnhemland)	2
	April	South Alligator (Kakadu)	1
1991	April	Berry Springs * (near Darwin)	1
	May	Tanami	1
1993	April	Beswick	1
	April	Lajamanu *	1
	April	Tennant Creek	1
	May	Katherine	2
	April	Katherine	1
Total			**18**

Risk Period February to July inclusive
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Table 2 Arbovirus Disease Risk Periods in the Northern Territory

VIRUS	FROM VECTOR/S ABUNDANCE & LONGEVITY	FROM VIRUS ISOLATION	FROM SENTINEL ANIMALS	FROM CASE DATA	PEAK RISK PERIOD	PROBABLE MAIN RISK PERIOD
MVE	Jan - Sept	Mar	Dec - Oct	Feb - July	Mar - May	Jan - July
Kunjin	Jan - Sept	Apr - June	Dec - Sept	May - June	Mar - May	Dec - July
RRV	Nov - Sept	Jan - Apr	-	Jan - Dec	Jan - Feb	Dec - June
BF	Nov - Sept	Dec - Apr	-	Dec - Mar	Feb - Mar	Nov - July

Table 3. Sentinel Chicken Surveillance Program 1993-1994.

New Kunjin Virus and Murray Valley Encephalitis Virus antibodies present in chickens.												
Location	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
Palumpa	*X +	* +		* +	* +		new flock	*XX		*XO		*
Murganella	*	*	*	*	*new flock		*	*	*XX	*XX		*XX
Smith Pt.	*	*	*	*	*		*	*	*	*new flock		*X
Gove	*X						*new flock				*XXO	
Howard Springs	*	*X	*X	*X		*				new flock		*X
Leanyer	*X	*	*	*	*		*		*XXX O		*X +	*new flock
Katherine	*X		*	*X	*	*				new flock *XX	*XXX	
CPRS (Fogg Dam)	*X newflock	*	*		*		*	*X	*XXX	*X +		* +
Pularumpi									*XX	*X		

Legend

O	one to two chickens show new antibody to Kunjin
X	one to two chickens show new antibody to MVE virus
XX	three to four chickens show new antibody to MVE virus
XXX	five and over chickens show new antibody to MVE virus
*	chickens bled this month
+	all chickens seroconverted

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Murganella	*	*	*	*	*new flock		flock *	*	*XX	*XX		*XX
Smith Pt.	*	*	*	*	*		*	*	*	*new flock		*X
Gove	*X						*new flock				*XXO	
Howard Springs	*	*X	*X	*X		*				new flock		*X
Leanyer	*X	*	*	*	*		*		*XXX O		*X +	*new flock
Katherine	*X		*	*X	*	*				new flock *XX	*XXX	
CPRS (Fogg Dam)	*X newflock	*	*		*		*	*X	*XXX	*X +		* +
Pularumpi									*XX	*X		

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