衞生防護中心
Centre for Health Protection

Scientific Committee on Vector-borne Diseases

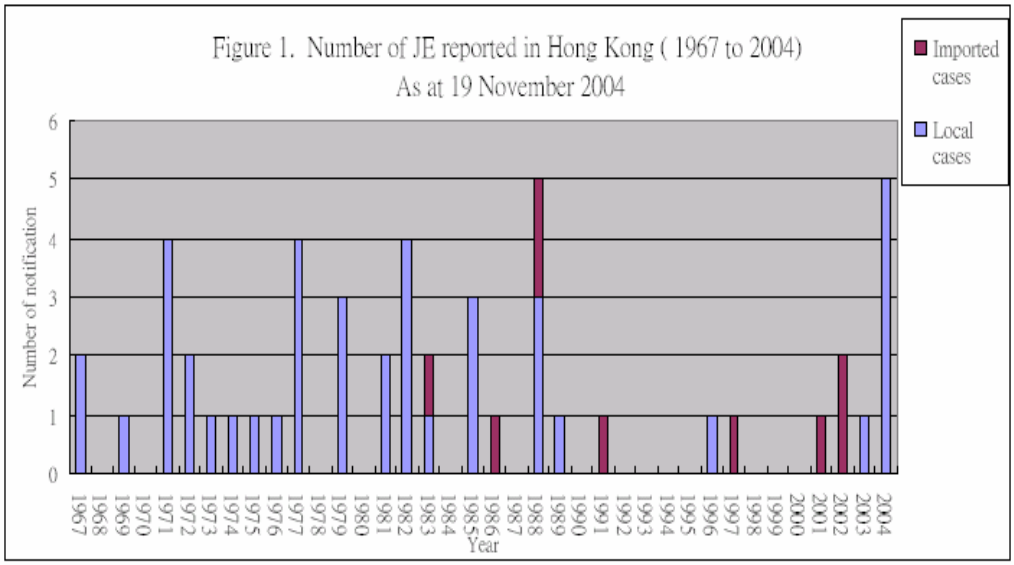
Human JE Vaccination – considerations for special groups

Purpose

At the third meeting of the SCVBD on 19 October 2004, members agreed that while JE vaccination was not indicated for the general population, a more detailed assessment of the need for JE vaccination in special "at risk" groups was needed. This paper provides an update on the local JE situation and discusses the risk of infection in special population groups with a view to guide decisions on a vaccination strategy.

Situation update

2. As of 19 November, five local cases of JE have been confirmed this year. This is the highest number of local cases recorded in a single year since 1967 (Figure 1). Epidemiological investigation did not reveal any linkage among the cases. The most recent case involved a 40 year-old man who lived in Southern district. According to AFCD, no pig farms are situated on Hong Kong Island and neither is the Island a major roosting site of migratory birds, although there have been records of egrets and black-eared kites roosting. Several illegal cultivation sites exist in the vicinity of the patient's residence and workplace (close to 2 km radius), the significance of which in relation to the case is still under investigation.



3. Among 7 local cases reported since 1996, 2 were fatal. Four cases lived nearby pig farms (Table 1), three of which were in Yuen Long district. Unlike the patterns seen in JE endemic countries, adults are as likely to become affected as children.

Table 1 Summary of local cases of JE since 1996 (as at 19 November)

Notification year	0nset date	Age /sex	Residential district	Occupation	Nearby pig farm	Outcome
1996	1 July 1996	M/15	Fanling	Student	Yes	Died
2003	25 October 2003	F/38	Yuen Long	Housewife	Yes	Discharged
2004	29 May 2004	F/29	Kwai Chung	Domestic helper	No	Died
2004	8 June 2004	M/45	Yuen Long	Teacher	Yes	In-hospital
2004	11 June 2004	M/50	Sham Shui Po	Unemployed (street sleeper)	No	Discharged
2004	16 October 2004	M/5	Yuen Long	Student	Yes	Discharged
2004	1 November 2004	M/40	Southern	Data analyst	No	In-hospital

Pig farmers and slaughterhouse workers

4. Serological surveys among pigs in Hong Kong showed that a JE infection cycle is present. Seroprevalence of JE antibodies ranged from less than 20% in pigs raised through the winter/dry season to around 90% in pigs raised through the spring/rainy season (1). Pig farms are present in the neighborhood of 4 out of 7 local JE cases since 1996, including all 3 of the Yuen Long cases. A batch of mosquitoes caught recently in Tseung Kong Wai, Yuen Long, was tested positive for JE by PCR. Serology studies on pig farmers and slaughterhouse workers performed in 2003 and 2004 revealed that none of those below 40 had evidence of immunity against JE (Annex 1), but the sample size was not large. Among the 26 slaughterhouse workers who had serology tests performed in 2004, 11 had worked for 2 years or less in the slaughterhouse.

Residents of Yuen Long district

5. Results from a serological study conducted in 2004 among GOPC attendees did not find higher JE seroposivity among clients of Yuen Long district compared with other districts (Annex 2). However, a very large sample size would be needed to discern statistically significant differences between districts due to very low overall JE seroprevalence in Hong Kong. Besides, the effects of other confounders such as population mobility have not been adjusted for. Inferring the district of residence from GOPC locations may have also influenced the results. If one estimates the risk of infection based on clinical cases of JE between 2003 and 2004 (until November), Yuen Long seems to have a higher incidence (1 in 340,000 person-years) compared with the general populationa (1 in 2,200,000 person-years). However, the risk of infection in Yuen Long district was much smaller if the calculation covered a more extended period (e.g., about 1 in 2,000,000 person-years during 1989 – 2004).

Laboratory workers

6. At least 22 cases of laboratory acquired cases of JE have been recorded in the USA. JE virus may be transmitted in a laboratory setting through needlesticks and other accidental exposures. Vaccine-derived immunity presumably protects against exposure through percutaneous routes. Exposure to aerosolized JE virus, and particularly to high concentrations of virus, that may occur during viral purification, potentially could lead to infection through mucous membranes and possibly directly into the central nervous system through the olfactory epithelium. Whether vaccine-derived immunity protects against such exposures is unknown, but vaccination is recommended for laboratory workers with a potential for exposure to infectious JE virus in countries like the USA (2), Canada (3), and Australia (4).

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[a] Note: Risk estimates are based on 2003 mid-year population published by the Census and Statistics Department; estimates are subject to large fluctuations due to small number of cases.

Considerations in human vaccination

7. Adverse events associated with human JE vaccination are asfollows. Local vaccination reactions occur in about 20% of vaccinees, mild systemic illness in about 10%. Hypersensitivity reactions occur in 0.6% of vaccinees, which manifest as urticaria, angioedema, respiratory distress, and hypotension. Incidents of fatal anaphylaxis have been reported. Postvaccination neurological complications such as encephalitis and peripheral neuropathy have been reported in 1-2.3 per million vaccinees (2, 5). About 1-4 cases of severe neurological adverse reactions might be expected if one were to vaccinate all Yuen Long residents (527,000) using a three-dose primary series.

8. The risk of infection for an individual is highly variable and depends on many factors that affect exposure such as the extent and nature of outdoor activities, use of protective measures, bed nets and repellents, and lodging in air-conditioned or well-screened rooms (2). Risk assessment over a relatively short time frame should be interpreted cautiously owing to significant risk fluctuations from year to year (e.g., number of clinical cases reported). Furthermore, Hong Kong's mobile population complicates risk assessment in defining human JE vaccination strategy based solely on residential area.

9. In endemic areas where most adults are immune and clinical encephalitis cases primarily occur in children, national JE immunization programmes target at children. However, in Hong Kong where the adult population below 40 years is largely immunologically naïve, childhood immunization programmes would not result in reduction of adult cases. 5 of the recent 7 local cases occurred in people aged 20 and above.

Advice sought

10. Members are invited to note the contents of this paper and discuss on the JE vaccination strategies.

Centre for Health Protection
24 November 2004

References

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3. Canadian Immunization Guide 6th Edition 2002 (accessed on 22 November 2004) http://www.phac-aspc.gc.ca/publicat/cig-gci/index.html#toc
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Annex 1

Seroprevalence of JE antibodies among different population groups, 2003

Population Group	Age Group		Total
	Below 40	40 or above	
Pig farmers	0/5 (0%)	8/29 (27.6%)	8/34 (23.5%)
Abattoir workers	0/4 (0%)	1/29 (3.4%)	2/34 (5.9%)*
Yuen Long local residents	1/70 (1.4%)	1/38 (2.6%)	2/108 (1.9%)
GOPC patients	1/36 (2.8%)	17/106 (16.0%)	18/142 (12.7%)
Blood donors	0/15 (0%)	0/15 (0%)	0/30 (0%)
Total	2/130 (1.5%)	27/217 (12.4%)	30/348 (8.6%)

Notes:

- *The age of one seropositive abattoir worker was unknown.
- An antibody titre of 1:40 on haemagglutination inhibition assay was used as cutoff for seropositivity

Seroprevalence of JE antibodies among different population groups, 2004

Population group	Total number of specimens	Seropositivity rates by age group	
		Below 40 years old	40 years old or above
Neighboring residents of JE cases	558	0/268 (0.0%, 95% CI: 0.0%, 1.8%)	8/290 (2.8%, 95% CI: 1.3%, 5.6%)
Pig farmers and abattoir workers	51	0/14 (0.0%, 95% CI: 0.0%, 26.9%)	0/37 (0.0 %, 95% CI: 0.0%, 11.7%)
Mai Po local residents and workers	48	0/9 (0.0%, 95% CI: 0.0%, 37.5%)	1/39 (2.6%, 95% CI: 0.1%, 15.2%)
GOPC patients	1190	1/60 (1.7%, 95% CI: 0.1%, 10.2%)	27/1130 (2.4%, 95% CI: 1.6%, 3.5%)
Subtotal	1847	1/351 (0.3%, 95% CI: 0%, 1.8%)	36/1496 (2.4%, 95% CI: 1.7%, 3.4%)
Blood donors	200	0/200 (0%)	

Notes:

- An antibody titre of 1:40 on haemagglutination inhibition and immunofluorescence assay was used as cutoff for seropositivity

Annex 2

Seroprevalence of JE antibodies among the clients of 57 GOPCs

Districts	Positive no./ Total no. of specimens for <40yr old	Positive no./ Total no. of specimens for ≥ 40yr old	Total
Hong Kong			
Central and Western District	0/0 (0%)	0/8 (0%)	0/8 (0%)
Eastern District	0/2 (0%)	2/73 (2.7%)	2/75 (2.67%)
Southern District	0/0 (0%)	0/19 (0%)	0/19 (0%)
Subtotal	0/2 (0%)	2/100 (2.0%)	2/102 (1.96%)
Kowloon			
Kowloon City District	0/5 (0%)	5/145 (3.4%)	5/150 (3.33%)
Kwun Tong District	0/10 (0%)	3/204 (1.5%)	3/214 (1.4%)
Sham Shui Po District	0/1 (0%)	3/25 (12%)	3/26 (11.54%)
Wong Tai Sin District	0/0 (0%)	1/41 (2.4%)	1/41 (2.44%)
Yau Tsim Mong District	0/3 (0%)	3/72 (4.2%)	3/75 (4%)
Subtotal	0/19 (0%)	15/487 (3.1%)	15/506 (2.96%)
New Territories East			
Island District	0/2 (0%)	0/15 (0%)	0/17 (0%)
North District	0/2 (0%)	3/65 (4.6%)	3/67 (4.48%)
Sai Kung District	0/9 (0%)	0/63 (0%)	0/72 (0%)
Shatin District	0/9 (0%)	4/125 (3.2%)	4/134 (2.99%)
Tai Po District	0/2 (0%)	0/27 (0%)	0/29 (0%)
Subtotal	0/24 (0%)	7/295 (2.4%)	7/319 (2.19%)
New Territories West			
Kwai Tsing District	0/5 (0%)	1/48 (2.1%)	1/53 (1.89%)
Tsuen Wan District	1/3 (33.3%)	0/33 (0%)	1/36 (2.78%)
Tuen Mun District	0/3 (0%)	1/72(1.4%)	1/75 (1.33%)
Yuen Long District	0/4 (0%)	1/95 (1.1%)	1/99 (1.01%)
Subtotal	1/15 (6.7%)	3/248 (1.2%)	4/263 (1.52%)