

## The Epidemiology of Japanese Encephalitis in China

Xu zongke

Lanzhou Veterinary Research Institute, China

## Contents

- Introduction
- The current situation of Japanese encephalitis in China

## Introduction

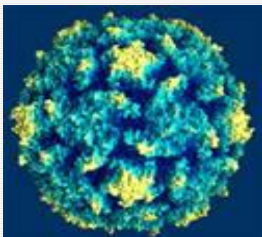
Japanese encephalitis (JE), a mosquito-borne flaviviral infection, is the leading recognized cause of mammals encephalitis in Asia and parts of the western Pacific. First recognized in Japan in 1871 and first isolated from a fatal case in Japan in 1934.



## Introduction

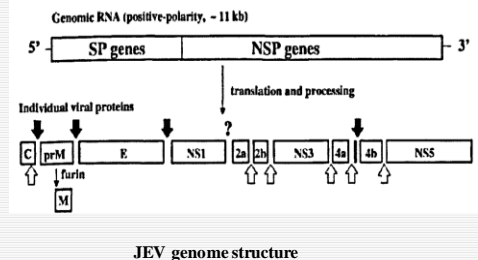


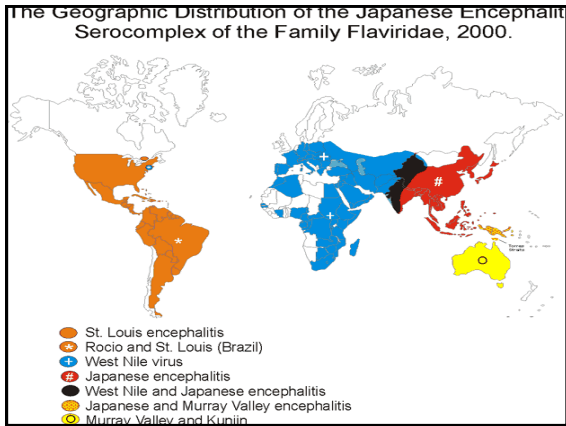
## Pathogeny



JEV is a positive single stranded RNA virus, 10 976 bases encoded envelope (E), membrane (M) protein, capsid (C) protein and nonstructural (NS) protease complex, NS2A, NS2B, NS3, NS4A, NS4B, NS5.

## Etiology





### The current situation of Japanese encephalitis in China

There are 4 main genotypic variants of JEV, as follows:

Genotype	isolate
JEV type I	China(1977), India, Japan, Nepal, Sri Lanka and Vietnam
JEV type II	Cambodia and northern Thailand
JEV type III	China(1941), Indonesia, Malaysia, and southern Thailand
JEV type IV	Indonesian and Malaysian regions

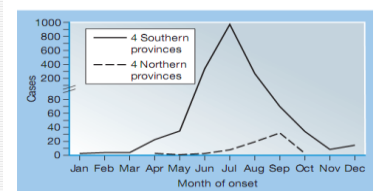
### The current situation of Japanese encephalitis in China



Reported cases of Japanese encephalitis (JE) for Asian countries and for China only, 1970 to 2000. (Data from World Health Organization reports.) Incidence rates for China are based on enumerated rural populations of children younger than 15 years in 1982 and 1990. Incidence of JE per 100,000 population by province, China 1983 to 1993.

### The current situation of Japanese encephalitis in China

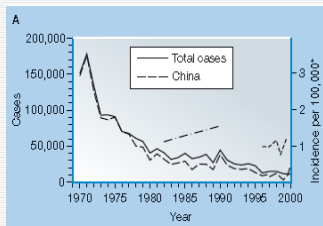
#### Seasonal Patterns



Seasonal distribution of Japanese encephalitis cases in four southern and four northern provinces, China.

### The current situation of Japanese encephalitis in China

#### Incidence of Japanese encephalitis



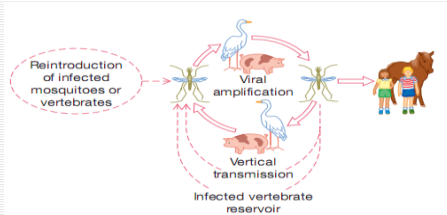
### The current situation of Japanese encephalitis in China

#### Mortality and morbidity of Japanese encephalitis

Although with high natural infection rate (98%–100%) in pigs, clinical disease is relatively rare, and the primary illness associated with JEV infection in pigs is fetal abortion and stillbirth in infected sows and aspermia in boars.



## The current situation of Japanese encephalitis in China



Transmission cycle of Japanese encephalitis (JE) virus. The open arrows indicate known portions of the cycle, and the dashed arrows indicate speculative portions. Infections and illnesses in humans and horses are incidental to the transmission cycle. The overwintering mechanism for JEVirus is undefined, but experimental field observations suggest a role for vertical transmission in vector mosquitoes (*Culex tritaeniorhynchus*).

## The current situation of Japanese encephalitis in China

*Culex* mosquitoes, especially *Cx. tritaeniorhynchus*, are the principal vector for both zoonotic and human JEV transmission throughout China.



## Diagnosis of Japanese encephalitis in China

- Virus isolate
- Nucleic acid amplifying tests
- Enzyme-linked immunosorbent assay
- Plaque reduction neutralization tests

## The current situation of Japanese encephalitis in China

- Control of Japanese encephalitis in China
  - 1 Vaccination control of humans
  - 2 Vaccination control of pigs
  - 3 Chemical control of vectors



## The control of Japanese encephalitis

- Vaccination control of humans

Vaccine Type	Substrate	Viral Strains
Inactivated	Mouse brain	Nakayama, Beijing-1 (P1)
Inactivated	cell culture-derived JE vaccine (IXIARO)	(P1)
Inactivated	Primary hamster kidney cells	P3
Live-attenuated	Primary hamster kidney cells	SA14-14-2

## The current situation of Japanese encephalitis in China

Average annual JE incidence rate per 100,000 by province, China, 2000-2003

Province	Type of vaccine
GZ, CQ, SC, SX, YN, HN	live-attenuated
AH, HB, HN, GX, JX	inactivated
SX, GS, JS, SDFJ, GD, ZJ	live-attenuated
NMG, HN, TJ, BJ, JL, HLJ HB, NX, SH, LN,	live-attenuated

## The current situation of Japanese encephalitis in China

### □ Vaccination control of pigs



The vaccination of pigs represents another potential strategy to control JE, but it is not widely used.

## The current situation of Japanese encephalitis in China

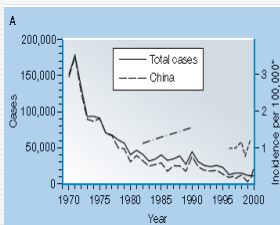
### □ Chemical control of vectors

Chemical control of vector populations with insecticides plays a marginal role in JE control.



## The current situation of Japanese encephalitis in China

### □ Incidence of Japanese encephalitis



1960s-1970s : 10-20 per 100,000

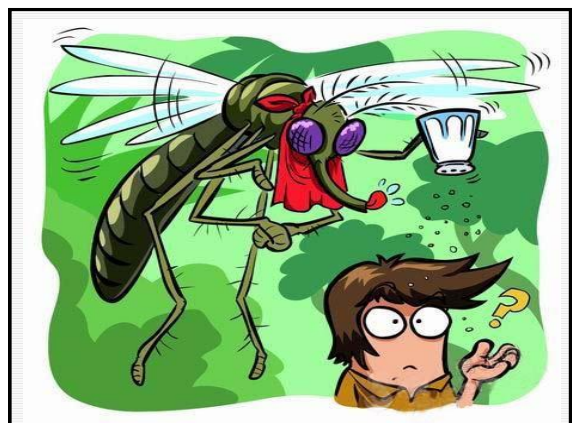
1980s-1990s: 0.6-0.8 per 100,000

## Conclusions

Now, China has achieved great progress in JE control due to two major actions. Firstly the advocated universal vaccine program; Secondly, Since 2006, JE has been classified a notifiable disease and all cases must be report to the CDC.

## The strategic elements in the future

A NIP has been implemented in areas prone to epidemics of JE, but this has not been considered necessary in countries that see only sporadic cases. A good surveillance system with reliable data is nonetheless essential. In areas where JE is endemic, certain groups who may be at high risk of acquiring JE should be closely monitored. This includes preschool and young school-aged children who like to play outdoors. People who live close to porcine husbandry or rice-growing areas are also at high risk of mosquito contact and hence are at high risk of acquiring JE.



---

Thanks For You attentions!

