VMF 958: Public Health and Food Safety

Mosquito-associated diseases

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Fall 1997: heavy rains

Epidemic in wild ungulates

Numerous cases: fever of unknown origin in residents of region

170 deaths

Estimated 27,500 people affected

10 Nov. 1997 - 8 February 1998

Largest reported outbreak of Rift Valley Fever in East Africa
• Initially recognized in Kenya 1930s
  - 4700 sheep and lambs died
  - 200 human cases
• Generally sub saharan
• Large outbreaks reported
every 7-10 years
  1951 - South Africa :
    100,000 sheep and cattle died
    20,000 human cases
  1977 - Egypt
    18,000 human cases 598 deaths
Pathogen: Bunya-like RNA virus, a Phlebovirus

Transmitted by more than 22 species of mosquitoes: Anopholes, Culex, Aedes Mansona,

Transovarial transmission occurs

Amplification in cloven hoved animals

Outbreaks: periods of extensive rainfall “dambos” (elephants)
Clinical signs:

**lambs, kids, calves:** anorexia, lethargy, fever, oral ulcers, catarrhal stomatitis

~90 - 100% mortality in lambs
> 20 % calves

**cows and ewes:** fever, anorexia, ataxia, tachycardia, abortion

cattle: ~10% mortality
sheep: ~20% mortality

death within 48 hours

Current vaccines of marginal value
Clinical signs in humans

- Broad spectrum
  - incubation period 4-6 days
  - no clinical signs
  - mild flu-like symptoms and rapid recovery 2 - 7 days
  - mild hepatitis
    - elevated liver enzymes
  - retinal damage and permanent loss of vision
  - hemorrhagic fever
    - shock
  - death ~ 1% of patients
Livestock in home

Killed animal

Butchered animal

Drank raw milk

Touched fetus

Sheep

Cow

No infection

Acute infection

Differential diagnosis: diseases associated with abortion and reproductive failure

- enterotoxemia of sheep
- bluetongue of sheep
- Ephemeral fever
- Wesselsbron virus
- Middle lung virus
- brucellosis
- vibriosis
- trichomoniasis
Clinical situation suggesting including Rift Valley Fever in your differential diagnosis

Mortality in lambs, kids, or calves

Abortion in cows and ewes

Flu-like illness in people
Mosquito-associated diseases

The Spanish American war

the Panama Canal

and Primates
February 15th, 1898:  
the battleship Maine explodes in Havana Harbor.

April 19th: US declares war (economics, Cuban independence)

50,000 US troops sent to Cuba
1,000s of troops became ill

fomite theory

Henry Carter: 2 weeks between attacks

extrinsic incubation period
Carlos Finlay

*Aedes aegypti* identified as vector
Yellow Fever in the US

New York - 1668
Boston - 1691
Charleston, SC - 1699

13,000 deaths in the Mississippi Valley - 1878 - 1990s
20 epidemics reported in Philadelphia
15 epidemics in New York
8 epidemics in Boston
7 epidemics in Baltimore

5,000 cases, 1,000 deaths in New Orleans 1905
Two recognized cycles: sylvatic, urban
	sylvatic: arboreal primates = reservoirs
	viremia- 1- 4 days

tree-top mosquitoes (*Aedes africanus*)

maintain sylvatic cycle

down to the ground: (*Aedes simpsoni*)

urban cycle: *Aedes aegypti*
Clinical signs

Arboreal monkeys: minimal clinical signs

Great Apes and Humans: 3-6 days incub.

Mild to severe - high fever, cephalalgia, chills, nausea, vomiting

Fever is diphasic:
1st phase - mild and subsides quickly
2nd phase - hepatic and renal disease, hemorrhage epistaxis, hematemesis, melena.

Leucopenia, and albuminruia: common laboratory findings
New World primates
Severe and routinely fatal

*Alouatta* (Howler monkey)
*Ateles* sp. (red faced black spider monkey)

Hemorrhage from numerous orifices, hepatitis, icterus
Yellow Fever

Risk factors:

South America - 100 - 300 case/year
- often occupationally related
- farmers: clear cutting
- less common in urban areas
- 20 -39 year old males

Africa
- several thousand cases/year
- urban cases are more common

Vaccine - reduced number of cases,
recent adverse vaccine reactions
CDC has modified recommendations
Eastern Equine Encephalomyelitis

1831: Massachusetts

1933: Delaware, Maryland, New Jersey, Virginia
1935: North Carolina
1938: First human case diagnosed
1938 - 1961: 112 cases
1947: 14,334 equine cases
   11,027 died
Eastern Equine Encephalomyelitis

Ontario - Argentina
Humans and horses are dead end hosts
Eastern Equine Encephalomyelitis

Maintenance of Eastern Equine Encephalomyelitis virus transmission

Shore Birds

Aedes sollicitans
Aedes vexans
Mansonia perturbans

Culiseta melanurica

Pheasants
Sparrows

Horse

Human
Pheasants, sparrows: lethargy, ataxia, mortality

Fever, ataxia, lethargy

High mortality
Clinical signs

Horses: Ataxia Circling Stupor Seizures Teeth grinding Head pressing

Generally fatal

70 Cases in NC 2003
Eastern Equine Encephalomyelitis

Differential Diagnosis

Rabies
Pesticides
Mycotoxins
Lead
Clinical signs in Humans

Clinical signs in humans:

- Fever
- Stiff neck
- Stupor
- Confusion
- Severe headache
- Nausea and vomiting
- Cranial nerve palsies
- Meningitis
- Paresis or paralysis
- Altered reflexes
- Increased intracranial pressure
- Encephalitis
- Convulsions
- Coma
- Death: up to 85% mortality (elderly, children)
Japanese B Encephalitis

Leading cause of encephalitis in Asia: 30,000 - 50,000 cases/year

30% mortality
severe neurologic sequela
California Group Viruses

La Crosse virus: *Aedes* treehole mosquitoes, squirrels, mortality < 1%

Jamestown Canyon virus: white-tailed deer

Snowshoe hare
Western Equine Encephalomyelitis

Similar to EEE

lower morality (20-30%)

swine, emus develop clinical signs

life cycle may include

other vertebrates rodents reptiles