EPIDEMIOLOGY SECTION

Connecticut Epidemiologist

STATE OF CONNECTICUT DEPARTMENT OF HEALTH SERVICES Vol. 2, No. 8

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EASTERN EQUINE ENCEPHALITITS - 1983

Eastern equine encephalitis (EEE) is one of many mosquito-borne arboviruses that occur in the United States. Five arboviruses are of primary importance in human infection in this country: EEE, western equine encephalitis (WEE), St. Louis encephalitis (SLE), California virus group encephalitis (CE) and Colorado tick fever (CTF). Arbovirus infections constitute only a small fraction of the encephalitis cases reported to the Centers for Disease Control (CDC). Only 7.06% of all cases reported in 1981 were associated with arboviruses and none were associated with EEE (1). In 1982, a total of 160 cases of human arboviral encephalitis were provisionally reported of which 12 (7.5%) were due to EEE (2).

An arbovirus is a virus of vertebrates that is transmissible to arthropods. Arthropod vectors include mosquitos, sandflies, and hard (ixodid) and soft (argasid) ticks. Biological transmission requires a phase of virus multiplication in the arthropod vector.

The epidemiology of arbovirus infections in man is influenced by three major determinants: 1) behavior of the arthropod vector (including its biting habits and species on which it feeds, its breeding grounds and range of mobility, its longevity and factors affecting replication in the arthropod); 2) factors affecting the nature, frequency and duration of exposure of humans to the infected arthropod vectors; and 3) the presence of a necessary and/or amplifying host for the virus such as mammals or birds. (3)

EPIDEMIOLOGY

EEE virus is an enveloped, single-stranded RNA virus which is in the genus Alphavirus and the family Togaviridae. The geographic distribution of EEE virus is restricted to the eastern seaboard from New York to Florida and Louisiana. It extends into Central and South America as far as Argentina. The enzootic vector is the freshwater mosquito, Culiseta melanura. Wild birds serve as the reservoir for the virus. The virus is transmitted from bird to bird by the mosquito and the cycle occurs at low levels every year in endemic areas. In most cases, infection in the bird is asymptomatic with little mortality in the bird population. However, non-native birds, such as pheasants, frequently die in large numbers when the virus is active. Epizootics of EEE in pheasant flocks in Connecticut occurred in 1938, 1951, 1953 and 1955.(6) In 1972, there were 22 cases of EEE reported in horses as well as outbreaks in pheasant flocks. (7) Because of their susceptibility, pheasant flocks are excellent sentinel animals for monitoring the presence of EEE virus.

Spillover of the virus to mammals only occurs when viremia reaches sufficiently high levels to regularly infect mosquitos.

Even with a very virulent virus and a very receptive vector, virus titers in excess of 10^4 infectious doses of virus per milliliter of blood are usually necessary to infect the Cs. melanura. It may be lower for other arthropod vectors (7). In years when amplification of the virus does occur, levels of EEE virus in the bird population usually peak during midsummer.

Culiseta melanura is a selective biter, feeding almost exclusively on avian hosts.(5) In almost all cases Cs. melanura appears to be responsible for the epizootic cycle in nature. This mosquito breeds in and remains localized to certain types of deep swamp locations (e.g., cedar swamps) generally remote from human habitation. While some workers believe that Cs. melanura is capable of transferring the virus directly to the horse from the epizootic bird cycle, the majority feel that other mosquitos feeding on wild birds and larger vertebrates are responsible for the occasional and unpredictable movements from wild bird populations to horses and man. Aedes vexans, a fresh water mosquito, is often cited as a likely vector from birds to horses, but this hypothesis has not been proven. Aedes sollicitans, a salt marsh mosquito, appears to be the responsible vector in New Jersey. It is believed that these salt marsh mosquitos become infected when they pass through the cedar swamp habitant to reach the upland. Each brood of mosquitos moves into the upland for a bloodmeal and returns to the salt marsh to deposit its eggs.(5)

Despite these numerous hypotheses, no epidemic vector has been confirmed for EEE, nor have issues related to overwintering of the virus been resolved.

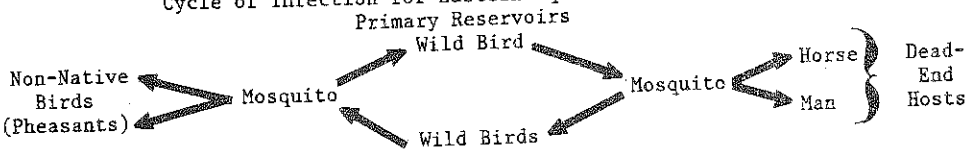
The events which lead to epizootic cycling and eventual epidemic transmission probably require an intricate set of circumstances. The critical factor may be the density of the Cs. melanura population in the early season. It is speculated that the introduction of the virus via infected birds migrating north may also be critical in its timing. Rain must be sufficient to restore water levels in the cedar swamps to provide a continuous breeding ground for Cs. melanura from early spring to late fall. Finally, some other mosquito populations of sufficient magnitude must be introduced at the right time to acquire

virus from the birds. All these factors occurred in proper order in New Jersey in 1959 and at least four other years since that time.

HORSES AND HUMANS

Despite the name of the disease, cases in horses are rare, but are usually fatal. Both the horse and human are dead-end hosts in the chain of infection (Figure 1). This may be due to the level of viremia in these hosts.

FIGURE 1
Cycle of Infection for Eastern Equine Encephalitis



The advent of horse involvement signals the possibility of human cases. Human infections occur primarily in late summer and fall and may be sporadic or part of a restricted sharp epidemic. Age distribution is affected by the degree of exposure to mosquitos and depends upon vocational and recreational habits of the individuals involved. All age groups are infected; however, disease is most likely to occur in children and in adults greater than 65 years of age.

CLINICAL ASPECTS AND DIAGNOSIS

The incubation period is short (4-21 days). The ratio of inapparent to apparent infection is low (2-4:1).(3) The virus initially multiplies in the cytoplasm of neural tissues. Viremia is apparent about 3 days prior to onset of CNS symptoms. Early symptoms include headache, chills, fever, and nuchal rigidity. The encephalitic stage follows in 1-2 days. It is rapidly progressive and often fatal, especially in small children. Mortality rates are greater than 50% and children who survive usually have neurological sequelae.

Diagnosis is made by virus isolation from the brains of fatal cases or more commonly by serological evidence of conversion (CF, HI, FA, or N test). Neutralizing and hemagglutination-inhibiting antibodies are detectable within a few days after the onset of disease and persist for many years. Complement fixing antibody appears later and may wane within two years. As with all serologic tests, a 4-fold rise in titer is required to confirm the diagnosis.

PREVENTION AND CONTROL

Control measures are aimed at 1) preventing transmission of the virus by eradicating or reducing the population of mosquito vectors, 2) increasing the host resistance, and 3) avoiding exposure to vector biters and use of protective clothing, repellants and screening of houses. An effective killed vaccine has been developed for horses, but none is available to protect humans.

EEE ACTIVITY 1983

Massachusetts

As of September 13, five cases in humans (1 fatal) and three cases in horses have been reported from Massachusetts and had onset of symptoms between August 4-18. (9) All human cases live or were exposed near the Hockamock Swamp area in southeast Massachusetts. EEE is enzootic in this area. From 1976-1981, no human cases were documented in Massachusetts. In 1982, two cases were reported. Massachusetts maintains an ongoing vector surveillance program to monitor the encephalitis virus. Mosquito pools are collected and analyzed to identify the types and numbers of mosquitos, presence and level of EEE virus and periods of amplification. Isolates of EEE were made from mosquito pools collected on 7/23, 7/30, and 8/7. At the present time, mosquito numbers are low and no significant increase is expected. Local ground spraying is being done to control the vector. If mosquitos emerge in large numbers, the Massachusetts State Health Department would support limited aerial spraying in southeastern Massachusetts. Current conditions do not present a serious threat of new cases of EEE in humans or horses.

Rhode Island

One human case occurred in a female from the South County area (North Kingston). Onset of illness was 8/14/83. (10) This is the same area where four cases in horses were documented, i.e., the southeastern part of the state. Another case occurred in Westerly in the southwest corner of the state. Personnel from the Vector-borne Viral Diseases Branch of the Centers for Disease Control have been asked to evaluate the situation. Cs. melanura and EEE virus are present in low numbers. A large pheasant flock is being monitored, and no activity has been reported in these birds. No aerial spraying is being done at this time and will not be considered unless there is a larger increase in the number of Cs. melanura and more horse cases occur.

Connecticut

No human cases of EEE have ever been documented in Connecticut. While Cs. melanura is found in Connecticut, the right environmental factors may not exist to allow these vectors to establish very large populations.(7) Both pheasant and horse cases have occurred in the past. Two cases in horses were reported in 1982. Two cases in horses have been reported this season, one from Ledyard and one from Colchester. Although there are approximately 41,000 horses in Connecticut (8), the paucity of horse cases in this state may be due to the use of EEE vaccine to protect these animals.

While we are monitoring activity in the neighboring states, we do not believe that EEE presents a risk to the citizens of Connecticut.

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AIDS - UPDATE

To date, 22 cases of AIDS have been reported in Connecticut. We are in the process of establishing more formal channels of AIDS surveillance throughout the state.

New developments since our last report include a program of public education concerning AIDS. We have already presented or have planned programs for the Hispanic community, the gay community as well as the Connecticut Alcohol and Drug Abuse Commission (CADAC) and the Department of Children and Youth Services (DCYS). Meetings have been planned to discuss infection control guidelines for a variety of public institutions. We are also currently working on an AIDS pamphlet which should be ready for distribution in the near future. A Spanish language AIDS pamphlet has already been sent to the Hispanic Health Council.

AIDS Surveillance Instructions for Connecticut Physicians:

1. When initial diagnosis of AIDS or possible AIDS is reached by a physician, the patient's name, attending physician's name, tentative diagnosis, and risk group if known, should be included in the information reported by mail or phone to:
   William Sabella
   150 Washington Street
   Hartford, CT 06106
   (203) 566-5778

2. At that point, we will send the attending physician a form, prepared by CDC, documenting some aspects of the patient's medical and social history. This form should be returned to Mr. Sabella.

3. Additional significant information on the patient, such as confirmation or rule-out of the diagnosis or the occurrence of serious complications, death, or recovery, should also be reported to Mr. Sabella.

AIDS CASES BY RISK GROUPS
CONNECTICUT*

Age Group	Homosexual & Bisexual Men	I.V. Drug Users	Hemophiliacs	Other (no known risk group)	TOTAL
25-29	2	1	1	0	4
30-34	2	2	0	0	4
35-39	2	1	0	0	3
40-44	4	1	0	1	6
45-49	0	0	0	0	0
50-54	1	0	0	0	1
55-59	2	0	1	1	4
TOTAL	13	5	2	2	22

*If a person is a member of more than one risk group, he or she is listed in the group that appears first.

GUIDELINES FOR EMERGENCY MEDICAL SERVICES

In June 1981, the Centers for Disease Control became aware of an increased occurrence of two rare diseases, Kaposi's sarcoma and Pneumocystis carinii pneumonia, in young homosexual men without underlying disease, in Los Angeles, San Francisco and New York City. Since the forming of the task force in June of 1981 to investigate these disorders, the complex of health problems associated with an alteration in natural immunity has been given the name Acquired Immune Deficiency Syndrome (AIDS).

AIDS has become the number one priority of the U.S. Public Health Service. It is a serious condition in which the normal functioning of the immune system is impaired so that the individuals affected become more susceptible to infections which usually do not affect the general population.

Nearly 94 percent of the 1,800 plus cases reported in the U.S. and Puerto Rico have occurred among people in four identified risk groups. Sexually active homosexual and bisexual men with multiple sex partners account for approximately 3/4 of all reported cases. Other risk groups include IV drug abusers, 17 percent; people with hemophilia, 0.8 percent; and Haitian entrants into the U.S., 5 percent. Forty-five percent of the total cases reported have been from New York City as compared to 1.2 percent reported from Connecticut.

The cause of AIDS remains unknown, but it appears most likely to be caused by an agent transmitted by intimate sexual contact, through contaminated needles (shared among drug users), or less commonly by percutaneous exposure to blood or blood products of AIDS patients. There is no evidence to suggest transmission of AIDS by airborne spread or through casual contact.

To date, there have been no known confirmed cases of AIDS in health care workers who have cared for or handled specimens of patients with AIDS. In addition, no known transmission of the AIDS agent has occurred through the emergency administration of CPR or in CPR classes.

Although mucosal contact with blood and body fluids of a person with AIDS is thought to be the major mode of transmission of AIDS, the role of saliva in the transmission of AIDS has not been defined. Viruses such as hepatitis B and herpes simplex are sometimes shed in saliva; however, transmission of these agents has never been documented to have occurred in association with CPR mannequins or emergency administration of CPR. For infection control purposes in the hospital or laboratory setting, CDC continues to recommend that the precautions to be taken for AIDS are similar to those taken for infection with hepatitis B and include avoidance (i.e., using gloves and gowns) of direct skin and mucous membrane contact with blood, blood products, excretions, secretions and accidental skin punctures.

The risk to members of Emergency Medical Services, fire and police department, of a significant exposure to AIDS during emergency medical care is minimal, however, the concerns are understandably great. Therefore, the following information and guidelines have been provided by the State of Connecticut Department of Health Services to address the concerns raised by individuals who may frequently be involved in providing emergency medical care.

I. EMERGENCY CARE FOR PATIENTS WHO ARE CONFIRMED OR HIGHLY SUSPECT CASES OF AIDS

A. Avoid direct skin and mucous membrane contact with blood and body fluids of an AIDS patient. Extra care should be taken to avoid accidental needle sticks and other skin punctures when caring for AIDS patients.

B. There is technically no exchange of saliva when giving CPR. However, since the role of saliva in the transmission of AIDS is unknown, it is recommended that a tongue depressor and an ambu bag or a mask with a flutter valve (i.e., Laerdal pocket mask) be used when administering CPR to an AIDS patient. To date, various pieces of equipment introduced specifically for protec-

tion from AIDS, such as special tubing and some flutter valve masks, have not been FDA approved.

C. Gloves should be worn when handling blood or body fluids of AIDS patients. Gowns should be used when clothing may be soiled with body fluids, blood, secretions, or excretions.

D. Blood and other specimens submitted should be labeled with special warnings, such as "blood precautions," or "AIDS precautions."

E. Blood spills should be cleaned with a disinfectant solution such as sodium hypochlorite (e.g., 1:10 dilution of a household bleach that is 5.25% hypochlorite solution).

F. Soiled laundry and needles should be handled in a fashion analogous to hepatitis B precautions. Disposable syringes should be used when possible. The Laerdal mask should be dry sterilized (i.e., ethylene oxide) after use.

G. If exposure to blood does occur, the skin or mucosal surface exposed should be thoroughly washed as soon as possible after the exposure. The individual's supervisor should contact the AIDS coordinator in the Epidemiology Section to discuss and evaluate the exposure (566-5778).

II. EMERGENCY CARE FOR A PATIENT WITH UNKNOWN MEDICAL HISTORY

Cases of AIDS in the United States have largely been reported from New York, Los Angeles and San Francisco (60%). 1.2 percent of the cases (22) have occurred in Connecticut. Given the relatively low incidence of AIDS in Connecticut, the risk of a significant exposure to the AIDS agent during emergency medical care is very low. Therefore, no new or extraneous equipment or precautions are recommended for the purpose of giving CPR to a person with unknown medical history other than those procedures and precautions already followed. Any skin or mucosal exposure to blood, secretions and excretions should be handled as an exposure to someone with unknown hepatitis B status (i.e., washing thoroughly with soap and water as soon as possible after exposure, cleansing of blood spills on hard surfaces with a disinfectant such as a 1:10 solution of sodium hypochlorite).

III. CARE OF CPR MANNEQUINS USED IN CPR TRAINING COURSES

To date, there has been no evidence to support fears of transmission of viral agents found in blood and saliva of infected individuals (such as hepatitis B virus and herpes simplex virus) through mouth-to-mouth contact with a mannequin used during CPR training. Well established procedures for cleaning the mouth of the mannequin after use include the following: the mouth of the mannequin should be scrubbed vigorously with 70% alcohol after use by each trainee. Mannequins should be dismantled and mouth parts should be cleaned and disinfected for 10 minutes in a 1:10 solution of sodium hypochlorite upon completion of the CPR course. Disinfected parts should be rinsed in tap water and dried before reassembling.

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REPORTED MORBIDITY - JULY, 1983

	AMEBIASIS	BOTULISM	BRUCELLOSIS	ENCEPHALITIS (TOTAL)	Primary	Post	FOODBORNE OUTBREAKS	GONORRHEA	HEPATITIS A	HEPATITIS B	HEPATITIS NON A NON B	HEPATITIS UNSPECIFIED	LEGIONELLOSIS	LEPROSY	MALARIA	MEASLES	MENINGITIS (All Types)	Aseptic	Hemophilus influenzae	Meningococcal	Other	MUMPS	PERTUSSIS	PSITTACOSIS	RABIES IN ANIMALS	REYE'S SYNDROME	ROCKY MT. SPOTTED FEVER	RUBELLA	SALMONELLA	SHIGELLA	SYPHILIS	TUBERCULOSIS (TOTAL)	Pulmonary	Other	TYPHOID FEVER
TOTAL JULY 1983	1	0	0	3	3	0	2	829	8	44	2	5	1	0	1	0	26	14	1	7	4	1	0	0	0	0	0	0	91	7	12	27	23	4	2
CUMULATIVE 1983	12	1	0	9	9	0	6	5164	36	219	25	13	25	1	7	8	137	34	32	38	33	13	0	1	3	0	1	0	498	118	92	103	82	21	2
CUMULATIVE 1982	22	1	3	14	10	4	10	4771	43	242	14	26	26	1	6	4	135	38	24	38	35	16	2	1	3	1	1	3	400	234	84	63	44	19	2

ERRATA

Vol. 2, No. 6, p. 25 "Laboratory experiments have demonstrated that cell-mediated immunity is the most important host-defense system in LD is the disease transmitted by the airborne route." should read "Laboratory experiments have demonstrated that cell-mediated immunity is the most important host-defense system in LD. The disease is transmitted by the airborne route".

Vol. 2, No. 7, p. 31 "people with hemophilia, 8%;" should read "people with hemophilia, 0.8%;"

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