Viral Encephalitis Information for Professionals

Agents: Alphaviruses (formerly known as group A arboviruses) are mosquito transmitted and can infect many vertebrate hosts in which infection is usually silent. Birds and rodents are important reservoir hosts. Horses can develop severe disease- a hallmark of new world outbreaks. Alphaviruses include the Venezuelan equine encephalomyelitis (VEE) virus, which could theoretically be produced in either wet or dried form and stabilized for weaponization. Although most experts think that VEE virus is the alphavirus most likely to be used, other new world viruses include Western Equine Encephalitis (WEE) and Eastern Equine Encephalitis (EEE). The New World viruses typically cause encephalitis.

Old World alphaviruses typically cause fever, rash, arthropathy, and myalgias rather than encephalitis. Disease is usually mild or asymptomatic. Clinical disease is rare, with children more likely to develop the severe syndrome. If delivered by aerosol route, disease in humans and other animals would occur simultaneously. Attack in areas populated with horses, ratites (ostriches, emus, rheas, and cassowaries) and/or appropriate mosquito vectors could initiate an epizootic epidemic. The virus does not persist more than a few hours in the environment.

Reporting Requirements for Disease: Report patients with suspected alphavirus infections within one week to your local health authority; or, call the Texas Department of State Health Services at 1-800-252-8239. Case clusters or multiple cases should be reported immediately.

Infection Control: Standard Precautions should be employed. Soap and water and hospital grade disinfectants can be used for environmental decontamination. Person-to-person spread is not reported.

Incubation Period: 1-6 days (could vary with route of infection, but often short)

Signs/Symptoms: VEE may be characterized by sudden onset with malaise, high fever (101-105°F), severe headache, rigors, photophobia, myalgias (especially in the legs and lumbosacral area), cough, sore throat, and vomiting. These symptoms may be followed by a prolonged period of asthenia and lethargy. Confusion leading to somnolence and coma may occur. The incidence of seizures is inversely related to age. With natural infection children, and rarely adults, may develop encephalitis. Although the overall case fatality rate is less than 1%, in children with encephalitis it may reach 20-35%. The incidence of Central Nervous System disease may be higher after respiratory infection such as in a bioterrorism attack.

Diagnosis:
Differential Diagnosis: Patients with VEE lacking neurological symptoms may be difficult to distinguish from patients with other illnesses such as influenza, dengue fever, prodromal Legionnaire's disease, or measles. Patients with neurological symptoms should suggest the diagnosis. More common bacterial and viral as well as

fungal and parasitic causes of meningitis and encephalitis should be considered in patients with neurological symptoms. Rickettsial, ehrlichial, and leptospiral illnesses should be considered in patients with headache and fever accompanied by neutropenia, thrombocytopenia, or elevated liver function tests.

Other potential bioterrorist agents that may be associated with flu-like prodromes (*Bacillus anthracis, Yersinia pestis, Coxiella burnetii*, Ebola, and smallpox) need to be considered. Other potential bioterrorist agents that cause flu-like illnesses (*Bacillus anthracis, Yersinia pestis, Coxiella burnetii*) need to be considered. More common causes of meningitis and encephalitis should be considered in patients with neurological symptoms.

Diagnostic Tests: Prior to onset of encephalopathy, VEE may be diagnosed by virus isolation from blood (collected without anticoagulant), CSF, or throat swab (up to 5 days); serology (on either serum or CSF); and PCR. IgM in a single serum sample (taken 5-7 days after onset) provides rapid presumptive diagnosis. However, this is only in persons without prior known exposure to VEE complex viruses. Diagnosis also can be confirmed either by antigen-capture enzyme-linked immunosorbent assay (ELISA) or reverse transcriptase polymerase chain reaction (RT-PCR) using a single serum sample or CSF taken early in the febrile, viremic phase. Viremia is brief and terminates as soon as antibodies develop.

Specimen Submission: All specimens must be triple contained in an approved shipping container and have biohazard labels. Specimens for viral culture must be shipped overnight on ice (+4°C), or frozen on dry ice (–80°C) if delays are anticipated; serology specimens may be shipped at room temperature. Culture is time consuming and must be performed in BSL3 facilities. The receiving laboratory must be alerted prior to transport by calling (800) 252-8239 (“press 1”). Newly available diagnostic tests may be discussed at that time Specimens must be accompanied by a Specimen Submission Form (G-1A) and submitted to the Texas Department of State Health Services Laboratory, 1100 West 49th Street, Austin, TX 78756.

Additional Tests: Leukopenia and lymphopenia are common. Thrombocytopenia may occur. Elevated serum glutamic-oxaloacetic transaminase (SGOT) levels are common. CSF may be under increased pressure in cases with encephalitis, and contain up to 1000 white cells/mm3 (predominantly mononuclear cells) and exhibit mildly elevated protein concentration.

Treatment: Supportive therapy should be given. Some patients may be treated with analgesics to relieve headaches and myalgias. Patients who develop encephalitis may require anticonvulsant and intensive care to maintain fluid and electrolyte balance, and ventilatory support.