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EMERGING INFECTIONS in 2001

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Emerging infections continues to be a hot topic in the infectious disease literature. Articles continue to be published revealing more insights into new diseases and disease processes. PCR and molecular techniques have made this detective work much reliable and accurate. Some of the more recent articles include the following:

Transmission of Lyme disease. How long must a tick bite?

Ticks can remain attached to humans for long periods of time feeding on blood. It has been debated how long a tick must remain attached for the Lyme spirochete *Borrelia burgdorferi* to actually migrate through the tick and flow into the human host. In this study, (Vignes, *JID* 2001, 183:773-8), infected ticks were allowed to attach to mice and were removed at 24 hour intervals up to 96 hours. Infectivity of both ticks and mice for *Borrelia burgdorferi* was tested using PCR techniques. No mice became infected if ticks were removed before 24 hours. Between 24 and 48 hours only 8% of mice became infected. Ticks allowed to feed 72 hours transmitted Lyme disease to 66% of host mice. Ticks allowed to feed 96 hours transmitted disease to 92% of host mice. If this can be correlated to humans, it would mean that the chances of acquiring Lyme disease for a tick that had been attached for less than 48 hours would be minimal

What are the complications associated with La Crosse Encephalitis?

La Crosse Encephalitis is one of the more virulent forms of California Encephalitis, a *bunyivirus* wide-spread throughout the United States. The disease has an animal reservoir and is transmitted to humans via mosquitoes primarily in rural areas. Some states have aggressive mosquito abatement control, in part for the control of potentially serious diseases like La Crosse Encephalitis. Many children may present with only flu-like symptoms such as headache, fever, and discharge from an emergency room with a diagnosis of "viral syndrome." However, a recent article by McJunkin suggests that some children who develop La Crosse Encephalitis may not fair so well (McJunkin, *N Engl J Med*, 344[11]:801-7). In an analysis of 127 patients, most were found to present with symptoms of headache, fever, vomiting, seizures, and disorientation during the summer months. Ten percent of children developed a complicated course including intubation and ICU care. Although all children survived, 12% overall had significant permanent neurologic problems including decreased IQ, paralysis, memory loss and behavioral changes or cerebral dysfunction

Hoof and Mouth Disease: Lessons for Humans?

Newspapers and periodicals have been filled with discussions on hoof and foot disease which has become epidemic in England and spread to adjacent areas in Europe. Although a vaccination does exist, it must be type-specific and predicting types in an epidemic as well as providing booster immunizations is expensive. As a result, most cattle who have acquired the disease are not immunized and the economics favor killing infected herds. However, the virus is easily spread. *Hoof and Mouth* disease is caused by a picornavirus, similar to coxsackie virus and other enteroviruses (Enserink, *Science* 2001, 291[5512]2298-2300).

Indeed, a human form, called hand and mouth disease, is caused by a related coxsackie virus or *Enterovirus 70/71*. These related enteroviruses cause encephalopathy and serious diseases in children, as described by a recent outbreak in Australia of *Enterovirus 71*. The concern goes beyond the acute illness: complications develop in a significant number of infected individuals and include irreversible forms of paralysis. The rapid spread of and infectivity of the related picornavirus of *Hoof and Mouth* disease have lead some to predict that a related virus similar to hoof and mouth could easily be spread throughout the world causing serious morbidity and mortality in humans. It might be important to keep in mind that the next patient who presents to the ER with a severe case of the flu may not have influenza A or B, but in fact, a more virulent form of other viruses that can infect humans rapidly.

Creation of Super Toxic Ebola Virus through Genetic Engineering

A group at the Marburg Institute in Germany recently published an article on the genetic engineering of the Ebola virus (Volchkov, et al., *Science*, 2001; 291:1965-8). The group first created the complementary DNA form of Ebola virus (Ebola is an RNA virus), it then altered an editing site on the DNA for a glycoprotein gene which thereby provided for increase synthesis of membrane glycoprotein GP. When tested in cells, the "new" Ebola virus had much more cytotoxicity than the wild-type strain. Although the virulence of the new strain was not tested, the fact that the genetically altered form of a virus was more toxic is significant. The authors state that, "We will be able to gain new insight into the role of each viral gene in the replication process and open new avenues for prevention and treatment of infection." However, in reading the article, one cannot help think that this is a new step forward in the undeclared race to create new biological warfare weapons.

What is the incidence of E-Coli 015H7 in patients with diarrhea who present to the emergency department?

Recently, the Emerging ID Net Study Group completed a prospective study at its eleven emergency departments on patient who present with diarrhea. To be included in the study, patients must have presented to the ER with a history of bloody stools or stools with occult blood and more than three loose stools per 24-hours, but had illness for less than one week. Of 873 patients

enrolled in the study, 549 stool cultures were sent. Most of the patients who had stool cultures sent had significant diarrhea with greater than 10 stools per day as well as visibly bloody stools. The pathogenic bacteria were identified in 168 stools and included (30%) and included *shigella* 15%, *campylobacter* 6.2%, *salmonella* 5.8%, and *E-Coli* 0157 2.6%. All *E-Coli* isolates were tested and were positive for *Shiga Toxin*. Because of the high incidence of pathogens found in the study, the authors recommend that all patients with acute bloody diarrhea have cultures sent.

This study confirms that the relative incidence of *E-Coli* 0157 as a bacterial cause of diarrhea is low. However, in contrast to past epidemiologic studies that show *campylobacter* as the most common bacterial pathogen in the US, this group found *shigella*. This may reflect the nature of the ED study sites as serving urban areas with a high mix of indigent patients.

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