ENY-662

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Ehrlichia in Florida[1]

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Ehrlichiosis is a disease caused by several tick-borne bacterial species in the genus *Ehrlichia* (pronounced err-lick-ee-uh) which were first recognized in 1935. Over the next several decades, since these veterinary pathogens that caused disease in dogs, cattle, sheep, goats, and horses were identified. Currently, three species of Ehrlichia in the United States and one in Japan are known to cause disease in humans; others will likely be recognized in the future as methods of detection improve.

Human Erhlichioses

There are two major types of human ehrlichiosis in the U.S.; human monocytic ehrlichiosis (HME), caused by *E. chaffeensis*; and human granulocytic ehrlichiosis (HGE), caused by *E. phagocytophila*. Clinically, they are difficult to differentiate. Symptoms for both include fever, headache, malaise, and muscle aches. Rashes occur more frequently with HME than HGE. Treatment for both are with antibiotics in the tetracycline family, most commonly doxycycline. Fatalities are rare (2-3% of diagnosed cases), but can occur as the result of complications from infection. Complete diagnosis requires serological or molecular tests to differentiate *Ehrlichia* species, but treatment should begin after clinical diagnosis. Asymptomatic infections probably occur with all *Ehrlichia.* Improved diagnostic tools and an increased awareness of ehrlichiosis are revealing that these infections are more common than previously suspected.

Equine and Canine Ehrlichiosis

Both horses and dogs are susceptible to *Ehrlichia*, although the species involved vary (see below for details). In dogs, the clinical signs for different types of ehrlichiosis are similar and difficult to separate clinically. These include fever, epilepsy, incoordination, lethargy, anemia, and bleeding episodes. Asymptomatic infections are probably common. The clinical signs in horses vary more between the two types of ehrlichiosis. Signs of equine granulocytic ehrlichiosis (EGE, *E. phagocytophila*) include fever, lethargy, anorexia, ataxia and limb edema. Equine monocytic ehrlichiosis (Potomac horse fever, *E. risticii*) most often manifests as colitis (inflamation of the colon), resulting in diarrhea, colic, loss of appetite, depression, and possibly laminitis.

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Biology of *Ehrlichia*

Ehrlichia are bacteria, related to *Rickettsia*, and are obligate intracellular parasites, meaning they can not survive outside of a cell. These bacteria have only recently begun to receive much research attention, and there are still many questions about their transmission cycles and reservoir hosts. There are likely to be taxonomic revisions of *Ehrlichia* and *Anaplasma* as further research occurs. Many *Ehrlichia* are tick-borne, although there are some species which use other invertebrates as intermediate hosts, such as snails and helminths. The transmission cycles for some *Ehrlichia* species have not yet been determined.

Ehrlichia are often differentiated based on the mammalian cell type they infect. Monocytes, granulocytes, and neutrophils are most frequently involved, and the common name of the resulting disease reflects the cell type (e.g. monocytic or granulocytic ehrlichiosis). More than one species of *Ehrlichia* can cause disease in most vertebrate hosts.

Species of *Ehrlichia* in the U.S.

Ehrlichia chaffeensis

Disease: humans (HME), rarely monocytic erhlichiosis in dogs.

Vectors: *Amblyomma americanum* (lone star tick); possibly *Dermacentor variabilis* (American dog tick)

Distribution: HME has been diagnosed from every state in the U.S. except the Dakotas. It is more common in the southeastern U.S., largely congruent with the distribution of *A. americanum.*

Reservoir hosts: probably white-tailed deer, rodents and/or dogs.

Ehrlichia phagocytophila

Disease: granulocytic ehrlichiosis in humans (HGE), horses (EGE), dogs, cattle.

Vector: In the eastern U.S., *Ixodes scapularis* (black-legged tick or deer tick). Elsewhere, other members of the *I. ricinus* group (*I. ricinus, I. pacificus, I. persulcatus*).

Distribution: U.S., Europe. In the U.S., it has been reported from areas where *I. scapularis* and *I. pacificus* are present, predominately in the northeast, midwest and California. Cases have been identified in Florida, but the level of transmission is unclear.

Reservoir hosts: rodents, possibly deer.

A note on species nomenclature: Initially, the agent of HGE was identified as an *Ehrlichia* but not named. Later, it was determined that the agent of HGE, *E. equii* (agent of equine granulocytic ehrlichiosis), and *E. phagocytophila* (agent of ehrlichiosis in cattle and deer in Europe), were genetically almost identical. The name *E. phagocytophila* has priority, and all three are now generally considered as *E. phagocytophila.* Some literature may differentiate between the three, and revision of the group is likely to change some generic and specific names.

Ehrlichia canis

Disease: primarily dogs (canine monocytic ehrlichiosis).

Vectors: *Rhipicephalus sanguineus* (brown dog tick), possibly *A. americanum.*

Distribution: worldwide.

Ehrlichia ewingii

Disease: primarily dogs (canine granulocytic ehrlichiosis). Human infection is rare.

Vectors: unknown, but likely to be *R. sanguineus* or *A. americanum.*

Distribution: primarily the southcentral states in the United States.

E. risticii

Disease: Horses (Potomac horse fever or equine monocytic ehrlichiosis); has also been isolated from dogs. An equine vaccine is available, but protection is of short duration and booster inoculations are required.

Vector: unknown but not tick-borne. Snails and helminths may be involved as intermediate hosts.

Distribution: much of North America, particular the east coast; Europe. More common along major waterways and in summer.

Other *Ehrlichia*

Other *Ehrlichia* have been described and may be agents of disease for livestock and wild animals. The taxonomic status of some of these are unclear and the transmission cycles are largely unknown.

Florida Situation

Typically, there are 1-5 reported cases of human ehrlichiosis in Florida each year. More cases probably occur, but are not severe enough to seek medical attention or are not confirmed by laboratory tests. Veterinary cases are not always reported, but both canine and equine ehrlichiosis also occur in Florida.

In August 2001 an unusual cluster of 4 ehrlichiosis cases in Jefferson county occurred, prompting the county health office to declare a medical alert. The conditions that led to this cluster are unknown, but it is likely to be related to tick populations and tick-human contact. The species of *Ehrlichia* involved was confirmed in one case, and is probable in the others, as *E. chaffeensis*.

Several species of ticks which transmit *Ehrlichia* spp. are present in Florida. These include *I. scapularis*, *A. americanum*, and *D. variablis*.

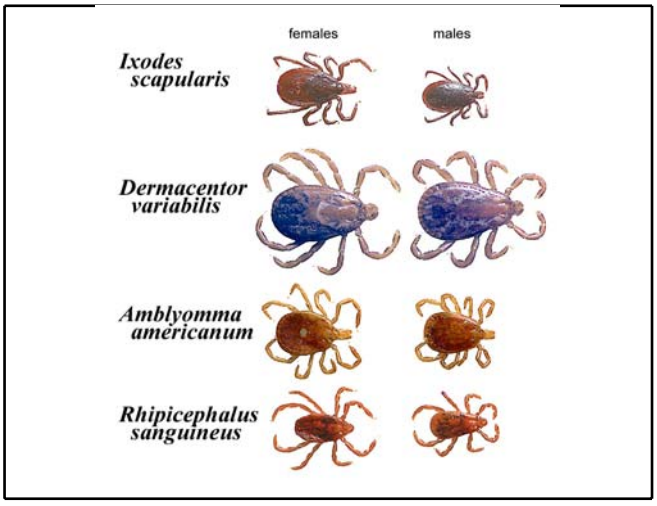

Figure 1. *Ehrlichia* vectors in Florida Credits: James Newman

Prevention and Management

As with any vector-borne pathogen, the primary disease preventative measure is to minimize contact with the vectors. For humans, protective clothing, such as long pants and socks tucked into pants will reduce tick contact; repellents containing DEET are effective against most ticks. Permethrin-based repellents can be sprayed on boots and clothing. For dogs, there are various treatments in sprays, spot-ons and collars (active ingredients include permethrin, fipronil, amitraz). Permethrin and pyrethroid based sprays and spot-ons for horses will reduce tick bites.

For all host species, thorough tick checks and grooming to remove attached ticks will reduce transmission of tick-borne pathogens. Use fine-tipped forceps to remove ticks; grasp the tick near the skin and pull straight back. Do not squeeze the abdomen or apply heat or petroleum products; this may cause the tick to regurgitate into the host!

Tick population reduction is difficult and it is unclear how effective it will be in reducing infection rates. Various methods have been tested, including vegetation management, acaracide treatment, host exclusion, and host treatment. Treatment of hosts, via treated feed or feeding stations that apply acaricide to hosts, are promising methods for population reduction of ticks which feed on deer.

Further Information

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Ticks: http://edis.ifas.ufl.edu/IG088