Central Appalachian Regional ERC

Occupational Risk and Emerging Tick-Borne Diseases

Arthropod Vectors

Pathogens transmitted by arthropod (insect) vectors are some of the most dangerous and unpredictable on earth and the most difficult to prevent or control because they are so resilient to intervention and deeply embedded in the ecologies and landscapes of the regions they infest. **Vectors** exponentially increase the range and transmissibility of pathogens over those that would depend on transmission by direct human contact because they are facilitated by multitudes of mobile, intelligent carriers who disperse from the source of an infection then home in like guided missiles on new victims.

Ticks of Medical Importance in the Southeast

- Blacklegged tick (*Ixodes scapularis*) is the main vector of Lyme disease

- Identifying features:
  - Reddish orange body with black scutum and legs
  - Females have long mouthparts, males have shorter mouthparts
- Lone star tick (*Amblyomma americanum*) is the main vector of Spotted fever rickettsiosis (Rocky Mountain spotted fever), Ehrlichiosis, Tularemia, and alpha-gal allergy.
- Identifying features
  - Reddish brown body, scutum and legs
  - Long mouthparts
  - Females have white dot on dorsal (back)
  - Males have white spots along bottom dorsal side

- American dog tick (*Dermacentor variabilis*) is a vector for Tularemia and Spotted Fever Rickettsiosis.
- Identifying features
  - Brown body and legs
  - Short mouthparts
  - White pattern across scutum

Vector Surveillance

Vector surveillance involves:

- Collection of vectors, speciation, and population tracking.
- The ticks are tested for pathogens: bacteria, viruses, and protozoa.
- Disseminate information on the risk for diseases in a geographic area.

Study of Alpha-gal Syndrome in Loggers and Fish and Wildlife Workers

- Alpha-gal: short for Galactose-alpha-1,3-galactose, a carbohydrate found in all mammals except Humans and Apes--beef, pork, mutton, venison
- Alpha-gal syndrome (also called Red Meat Allergy) is a Type I allergic reaction to this carbohydrate.
- In a study of Loggers and Fish and Wildlife Biologists we found that 30% of the study group was sensitized to this antigen.
- Participants reported no known meat allergies; however, approximately one third of the participants reported frequent heartburn.
- Major risk factors included:
  - B-Blood type appears protective
  - History of hives increases risk
  - Greater frequency of imbedded tick removal increases risk
  - Longer reaction time to tick bites increases risk

Study Methods

- Questionnaire
  - Demographics
  - Work/Years
  - Tick Exposure Risks
  - Symptoms
- Interview Style
- Blood Collection
  - Tested the blood serum for specific IgE antibodies to alpha-gal and determined the Blood Type (A, B, AB, O)

Vector Prevention Practices

- Tick control
  - Regular inspection of animals
  - Mow pastures
  - Acaricides
- Personal protection
  - Wear long sleeves
  - Tuck pants into socks
  - Repellent
  - Remove ticks immediately
- Pesticides necessary when other control measures unsuccessful
- Proper type and time of application helps efficacy
  - Ultra low volume (ULV) foggers
  - Small droplets contact and kill adults

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