Pennsylvania Game Commission Wildlife Disease Reference Library

Anthrax

<u>Other Names</u>: Charbon, woolsorter's disease, malignant edema, milzbrand, splenic fever

Cause

Anthrax is an infectious disease of animals and humans caused by the spore forming bacteria *Bacillus anthracis*. Anthrax is one of the oldest known infectious diseases, and the first written description of an outbreak in livestock in 1491 B.C. can be found in the Old Testament of the Bible. More recently anthrax has become a concern because it can be weaponized for use in biological warfare.

Significance

Humans can contract anthrax by coming into contact with infected animal carcasses or animal products. Anthrax spores can cause disease in humans when they are inhaled, are consumed in undercooked meat, or enter wounds. Laboratory workers, veterinarians, and people who may come in contact with contaminated carcasses or animal products are at greater risk of contracting this disease. Vaccines are available for these people who have an increased risk of occupational exposure. In areas where anthrax is known to occur in wildlife, hunters and trappers should not open carcasses that are found dead.

Species Affected

Anthrax is known to infect many species of homeothermic (warm-blooded) animals. Herbivores (plant eaters) are more susceptible to this disease than carnivores (meat eaters). Bison and impala are particularly susceptible. Some other wild herbivores reported with anthrax infections include but are not limited to white-tailed deer, moose, elk, bison, llamas, giraffes, and hippopotami. Wild carnivores known to be susceptible to anthrax include but are not limited to bobcats, cougars, black bears, raccoons, mink, badgers, lions, leopards, and cheetahs; although fatal disease in carnivores has only been observed in animals in captivity. Wild scavengers including wolves, foxes, ravens, and herring gulls are known carriers of anthrax organisms; they are not known to become ill. Captive ostriches and ducks have been reported with anthrax. Several species of domestic animals are also susceptible to this disease including cattle, sheep, goats, horses, pigs, dogs, and cats.

Distribution

B. anthracis is naturally distributed worldwide except for Antarctica, and anthrax epidemics have occurred historically on all continents. Some regions experience frequent outbreaks, while outbreaks in other parts of the world are uncommon. Anthrax epidemics occur with relative frequency in African game parks, as well as in wood bison in northern Alberta and the Northwest Territories in Canada. In the United States, anthrax outbreaks are more common in Texas, Louisiana, Minnesota, Nevada, and North and South Dakota. Anthrax is not known to have occurred in Pennsylvania in recent times.

Transmission

Anthrax spores are found in soil and they float easily, so they may be stirred up at times of heavy rain or flooding. When dry periods follow heavy rains, the spores collect in pools of water, and when the water evaporates the spores are concentrated in low-lying depressions. This is why anthrax outbreaks are often associated with dry periods following heavy rains or flooding, usually in the summer. Herbivores may consume anthrax spores when grazing closer to the soil or in depressions during times of drought. Herbivores may also be exposed via inhalation of spores. Male bison, for example, wallow in dirt pits during the rutting season, and this behavior creates clouds of dust that may contain anthrax spores which are inhaled by the animals. Direct transmission between herbivore hosts does not seem to play a significant role in outbreaks. Infected herbivores shed anthrax spores in their feces and urine.

Photo of wallowing bison courtesy of nps.gov by Jim Pisarowicz

Carnivores that scavenge carcasses of herbivores killed by anthrax are usually unaffected, but the spores they consume pass unchanged in the carnivore's feces and can contaminate new areas. Blood-feeding insects such as mosquitoes and large biting flies can transmit anthrax between animals. Anthrax can also be transmitted by introducing the spores to open wounds. Humans usually acquire anthrax from coming into contact with infected animals, contaminated animal products such as skins, or from fly bites.

Clinical Signs

There are three different forms of anthrax that occur depending on the route of infection. Ingestion of spores leads to the gastrointestinal form, while inhalation of spores leads to the respiratory form, and introduction of spores into a break in skin leads to the cutaneous form. Respiratory and gastrointestinal forms are most common in wildlife.

In herbivores, anthrax causes sudden severe illness including fever, brief excitement followed by depression, rapid debilitation, respiratory or cardiac distress, disorientation, staggering, trembling, collapse, and death within a few hours to days. Extensive swelling of the skin may also be observed. Wild carnivores can act as carriers of the bacteria. Pigs, cats, and dogs may experience swelling of the throat which can lead to suffocation following ingestion of contaminated meat.

Diagnosis

Anthrax is diagnosed by isolating the bacteria from samples taken from external lesions or superficial tissues.

Treatment

Antibiotics may be used to successfully treat anthrax, but they are usually not a realistic option for wildlife as wild herbivores are typically found dead.

Management/Prevention

Domestic animals at risk of contracting anthrax can be vaccinated. There has been some success vaccinating wildlife against anthrax in Africa. The number of anthrax cases in livestock has decreased greatly due to increased control efforts and vaccination. However, in some regions wildlife may act as reservoirs that could potentially introduce anthrax spores to domestic animals and humans. In areas where anthrax is known to occur, wildlife managers must take great care with suspected anthrax cases and must report them to the proper authorities. Carcasses should never be opened when anthrax is suspected, and people should wear protective clothing and gloves if they must work with suspect cases. Infected carcasses should be removed and burned or buried deep underground to prevent further environmental contamination.

Suggested Reading

Anthrax. General Disease Information Sheets. OIE: World Oraganisation for Animal Health. <http://www.oie.int/en/animal-health-in-the-world/disease-information-summaries/>.

Anthrax: Introduction. 2011. The Merck Veterinary Manual. <http://www.merckvetmanual.com/mvm/index.jsp?cfile=htm/bc/50400.htm&word=anthrax>.

Centers for Disease Control and Prevention (CDC). 2011. Anthrax. <http://emergency.cdc.gov/agent/anthrax/>.

Epizootiology and Ecology of Anthrax. United States Department of Agriculture, Animal and Plant Health Inspection Service, Veterinary Services.

Gates, C. C., B. Elkin, and D. Dragon. 2001. Anthrax. Pages 396-412 *in* E. S. Williams and I. K. Barker, editors. Infectious diseases of wild mammals. Iowa State University Press, Ames, Iowa, USA.

Hugh-Jones, M. E., and V. de Vos. 2002. Anthrax and wildlife. OIE: Scientific and Technical Review 21: 359-383.