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ANTHRAX

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## ANTHRAX

Anthrax is one of the oldest diseases known to man. The murrains described by the Egyptian temple physicians among man and animals is thought to be anthrax. Later it was described by the Greek physician, Hippocrates, as the black ulcer, a name that has been carried over as charbon. It was the first infectious disease of animals in which the causal agent was definitely demonstrated to be a bacterium by Koch. Shortly thereafter the first bacterial vaccine was developed by Pasteur, which has been modified but is still in use in some areas of the world among animals. Human vaccines are seldom used except in Russia, some Asiatic countries and the United States.

Anthrax in man and animals is an acute bacterial infection, which in man is usually a disease of the skin, while in animals it may range in severity from peracute, causing sudden death, to a chronic disease of lengthy duration. The disease in man is usually characterized by a papule and vesicle which develops into a black eschar, accompanied by an oedematous swelling of the adjacent tissues. The swelling is hard and firm and feverish. Pain is not a common feature and when present is attributed to the oedema. If the initial lesion is not treated, the infection may extend and spread to the regional lymph nodes and cause bacteraemia resulting in septicaemia and death. The anthrax bacteria, Bacillus anthracis, are highly virulent and multiply rapidly after entering the blood stream, and spread to all parts of the body. Usually the B. anthracis enters through the skin but they may be inhaled or ingested. In such cases initial symptoms are non-pathogenetic resembling a respiratory infection or a gastro-intestinal upset. As the disease progresses acute symptoms develop with shock and death following after three to four days. In pulmonary anthrax evidence of a haemorrhagic mediastinitis and meningitis are the usual post-mortem findings, while in gastro-intestinal infection the mesenteric lymph nodes are involved.

Anthrax was formerly one of the most common diseases of animals, and rather common among man. Practically all animals are susceptible to anthrax in some form or another. Cattle, sheep, goats, horses and wild herbivora are most commonly affected. Carnivora, dogs, cats, foxes and mink are known to develop the disease under certain conditions. Man and swine have considerable resistance, but are susceptible.

The reported occurrence of anthrax in man is rare in the United States and western Europe. The incidence of the disease is higher in South and Central America, Africa and Asia. It is primarily an occupational hazard of animal handlers, veterinarians, and processors of animal products including hair, hides and wool. Between 1945 and 1955, 483 cases were reported in man in the United States. Since then the incidence has declined steadily. In 1963 less than 10 human infections were reported, mainly among industrial workers handling animals or animal products.

The causal agent, Bacillus anthracis, is among the largest bacteria producing disease in man or animals (4 to 8 microns in length). The bacilli are usually arranged in chains in the tissue, but can be singular or in pairs. The anthrax bacilli have the ability to form spores which allows them to survive indefinitely in some environments or lesser periods of time in unfavourable environs. Laboratory confirmation is by the direct demonstration of the bacilli in lesions or discharges by microscopic examination. Fluorescent microscopy can be used by laboratories specializing in such techniques. The inoculation of guinea pigs and laboratory mice with exudates or tissues is necessary to confirm direct microscopic examination.

The ability of the B. anthracis to survive in certain areas, makes it essential to routinely vaccinate cattle and sheep in these enzootic zones. In the United States anthrax districts are known to exist along the western Gulf coast, lower Mississippi River valley, upper Missouri River valley, the great plains and the central valley of California. The successful use of animal vaccines in these areas has controlled anthrax, both in animals and man. Sources of anthrax, aside from direct animal contact, such as handling sick or dead animals, include contaminated hides, hair, wool, bones and bonemeal, fertilizer

and soil. Transmission can be indirect as by the use of shaving brushes in which spores persist in the animal hair used in the brush, or by other similar manufactured products. No cases attributed to shaving brushes or manufactured products have been reported in the United States in the past decade. Biting flies may serve as mechanical vectors among animals. Vultures and carnivorous birds may also disseminate the bacilli.

As stated previously, most of the cases seen in man are those involving the skin which begin as a papule or vesicle and develop into a black eschar. These usually begin with a penetration of the skin through which the anthrax bacilli enter and establish themselves. This is the usual lesion seen in the United States but other forms may occur. A few years ago, evidence of the respiratory or pulmonary anthrax was described by investigators in a wool textile plant in one of the north-eastern states. These cases were presumed to be caused by the inhalation of anthrax spores which were present in the wool they were handling. In Europe, this form of disease is called wool sorters disease. Another form of the disease is gastro-intestinal anthrax which is unknown in North America, but has been described in Africa, Asia and the West Indies. The disease is caused by the ingestion of raw or under-cooked meat which contains viable spores. The question of milk being a vehicle of anthrax spores has been raised but there are no known recent confirmed human cases in which milk was identified as being the source of infection. Milch cows with anthrax almost invariably stop lactating and any milk they would secrete would be grossly abnormal.

The possibility of transmission of anthrax from person to person is rare, although lesions of infected persons may contaminate bandages and bedding. Bandages and materials contaminated should be burned.

The advent of the antibiotics have reduced the human case fatality rate dramatically in the usual cases involving the skin. Penicillin, tetracycline and other broad spectrum antibiotics are all quite effective. Supplementary sulfadiazine has been used in severe cases. All human infections should be reported to the local health authorities, and if animals are involved to the animal health authority. There is no need for quarantine of human patients but farms where the disease occurs among animals should be quarantined until the infection is under control and the diseased animals have been disposed.