Information of the Friedrich-Loeffler-Institut on

**Anthrax**

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**Causative agent**
Anthrax is a contagious and often fatal animal disease. It can be transmitted to humans (zoonosis). The German term „Milzbrand“ results from the observation that the spleen of affected animals often looks black as if „burnt“.

The disease is caused by the spore- and toxin-producing bacterium *Bacillus anthracis*. The bacterium produces dormant forms, so-called spores, which are able to survive in the soil for several decades. Anthrax spores resist decay processes as well as drying and tanning of hides. The disease occurs worldwide and is a notifiable animal disease and zoonosis.

Anthrax spores ingested by animals with the food are often derived from the soil. Decades ago, it was common to bury carcasses of diseased animals or animal waste products. As anthrax spores survive in the soil for decades, the spores brought back to the surface (by digging up carcass burial sites or by floods) can again infect animals via the food and cause anthrax disease.

Furthermore, anthrax can be introduced by raw materials of animal origin from other countries. Particularly dry hides or furs from goat, sheep, cattle or horses and hair, wool or pig's bristle gained from these animals can be contaminated with the bacterium.

**Affected animals**
Anthrax particularly occurs in herbivorous livestock and breeding animals. Most commonly, ungulates such as pigs, goats and horses are affected. Predators can become infected by ingesting infected carcasses. Domestic and wild ruminants are highly susceptible to anthrax. Pigs, carnivores and also humans are moderately susceptible, and birds (with the exception of ostriches) are more or less resistant to the bacterium.

**Transmission**

*In animals*
In most cases, the agent is not transmitted directly between animals, but via food contaminated with anthrax spores derived from the soil.

*To humans*
Contact with diseased or dead animals or their excretions, secretions, blood and tissue. Handling of animals which have died of anthrax or have been destroyed or via contaminated materials, mainly materials of animal origin (fur, wool...). Ingestion of raw meat or other products contaminated with spores. Infected (diseased) humans are only rarely a source of infection. Infection is only possible in progressed stages of the disease via nasal/pharyngeal discharge, sputum, vomit, stool and tissue, e.g. scurf.

**Clinical picture**
In live animals, anthrax can only rarely be definitely diagnosed. The majority of cases are detected during meat inspection or at the carcass disposal unit.
Particularly after ingestion of contaminated food, the animals develop gastrointestinal anthrax which progresses rapidly, leading to signs of sepsis with fatal outcome. Similarly to intoxications, escape of dark non-coagulating blood from body orifices may occur. In individual cases, respiratory problems due to pharyngeal inflammation as well as discoloration (brown colour) and swelling of the larynx can be observed.

Human health risk
Infection of humans occurs by direct or indirect contact (dirt and smear infection) with infected animals or animal products. An increased risk may exist in persons directly handling the pathogen in the laboratory or working with animal products (e.g. animal hides, furs, bones). In Germany, human anthrax is very rare. The last case of cutaneous anthrax was reported in 1994.

Clinical picture in humans
The symptoms of anthrax depend on the site of entry of the pathogen. Infection may occur by direct skin contact (cutaneous anthrax), by breathing in anthrax spores (pulmonary anthrax) or by ingestion of diseased animals or contaminated animal products (gastrointestinal anthrax). Over the past few years, several cases of injection anthrax in drug users have been observed. Infection was caused by injection of substances contaminated with the pathogen.

For more information on human infections please refer to the website of the Robert Koch-Institute (www.rki.de).

Diagnosis
Isolation and characterization of the pathogen are done in the laboratory (responsible state laboratory, national reference laboratory for anthrax). As differential diagnoses pasteurellosis, blackleg, para-blackleg and intoxications must be excluded.

Distribution
Anthrax occurs worldwide, preferentially in warmer climate zones (South Eastern Europe, South America, Southeast Asia). Most commonly, farms (particularly ruminant farms) are affected, often in the vicinity of carcass burial sites and former tanneries. In industrialized countries anthrax is very rare.

In Germany, anthrax occurs sporadically and preferentially in so-called anthrax districts, i.e. frequently flooded plain tracts, where the sewage water produced by tanneries along the river play a crucial role. Over the past few decades, the case numbers in Germany have decreased considerably, as diseased animals are properly disposed of in carcass disposal units, the import of animal hides and bones is supervised and the import of bone-, meat- and carcass-meal is prohibited. Between 1981 and 2010, a total of 42 outbreaks of anthrax in animals were registered.

Control
In Germany, the control of anthrax in animal holdings is based on the regulation on the protection from anthrax and blackleg. As for all animal diseases included in the list of the World Organisation for Animal Health OIE, strict control measures are in force.

As a rule, anthrax diseased animals will not be treated. After official confirmation of an outbreak or suspected outbreak in an animal holding, the responsible authority may impose the culling and disposal of diseased or suspected animals. Bleeding of diseased or suspected animals for slaughter as well as skinning of animals which have died or have been culled is prohibited.

In humans treatment must be initiated without delay, if an infection with anthrax is suspected. The attending physician decides on the treatment as well as on its dosage and duration.