

# Anthrax

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## Synonyms

Splenic fever, charbon.

## Causative Agent

Bacillus anthracis. It is an acute septicemic disease caused by Bacillus anthracis, gram +ve.

## Animals affected

Sheep, goats & cattle & fowl susceptible.

## Route of Infection

Ingestion of contaminated feed and water, bone meal and offal's may also source of infection, wound

## Infection

This is the route in man causing malignant carbuncle or pustule.

## By biting flies

Stomoxys calcitrans and tetanus may mechanically transmit the vegetative organisms

## Inhalation

This is important in man – “wool sorters disease”. The spores are inhaled while handling contaminated wool. Cattle may also suffer by inhaling dust containing spores.

## Vaccination

The spores may vegetate and cause disease if the vaccine is not sufficiently attenuated.

## Spread

By biting flies, carnivores and wild birds, movement of infected hides, bone meal, hair and wool.

## Incubation period

1 to 14 days. When transmitted by biting flies it may be 24 to 48 hrs. Spores can viable for as long as 15 years in the soil, drought and alkalinity of soil favor for outbreaks.

## Pathogenesis

The bacilli may be ingested, it reaches tonsils and proliferate, then enters lymph glands and lymphatics, if bacteria reach stomach are killed by gastric juice. The spores unharmed by the gastric juice develop into bacilli in the intestines. They may penetrate the intestinal glands and lymphoid follicles reaching the mucosal and submucosal lymph spaces where they multiply. The spores

entering the skin, through wounds proliferate in the connective tissue. The cells of Reticulo endothelial system as well as the bactericidal substances produced by the body kill and inhibit the organisms. The organisms develop a capsule capable to resist the phagocytosis and lysis of antibodies. The capsule contains a glutamyl polypeptide. The substance inhibits the phagocytic activity of neutrophils prevents clotting of blood(it has fibrolytic property). A diffusible toxin is not formed *in vitro* supposed to form *in vivo* having local general effects.

**The toxin consists 3 factors**

Factor 1: edema factor

Factor 2 : protective antigen

Factor 3 : lethal factor

The capsule of bacteria swells by absorbing tissue fluid and so becomes gelatinous. The gelatinous fluid cannot be absorbed and so at those places where bacteria accumulate edematous swellings formed. The bacilli that proliferate and clog capillary and with the toxin may injure the endothelial causing haemorrhages. The anthrax toxin causes nerve cell degeneration cause apoplectic form of death. The toxin acts on the respiratory center in the brain and death is due to asphyxia. Death occurs in 12 to 36 hours after onset of symptoms. spores do not form animals. It is when carcass is opened that spores form, so carcass should not be cut and open.

**Symptoms**

The animals may die without exhibiting any symptoms. They are found dead with oozing of dark coloured tarry blood from the natural orifices- this is peracute type.

**Acute type**

increased temperature , depression, diarrhoea, dyspnea, edematous swelling in the brisket , flank and throat regions are observed.

**In horse**

Colic is a frequent symptom.

**Swine and dog**

Pharyngitis, swelling of throat .

**In birds**

Swelling of throat , comb , mouth, wattles and head, fever , tremors, convulsions and dysentery. The cause is acute lasting 24 hours.

**Lesions****Cattle**

Putrefaction sets in early since the blood is fluid and so the carcass bloated. Rigor mortis is never complete. Haemolysis(due to presence of haemolysins )sign of asphyxia. Subcutis - yellow gelatinous fluid, Spleen – enlarged, liver and kidney show congestion and degenerative changes. Haemorrhagic gastroenteritis. The mesenteric lymph glands – swollen, lungs – dark , edematous , haemorrhages, bronchi – blood froath, brain – congestion.



**Sheep**

Subcutaneous edema , peracute form.

**Horses**

Edema – abdomen , throat , limbs , external genitalia.Gastroenteritis,pharngitis.

**Swine**

Edema of throat , haemorrhagic necrosis, lymphadenitis of local glands.

**Dogs**

Peracute form, pharyngitis and edema of face, head and neck. May be noticed.

**Man**

Cutaneous anthrax occurs – resulting in malignant carbuncle.The organisms proliferate locally but when spores are inhaled- wool sorters disease.The condition becomes septicemic and generalized.

**Birds**

Haemorrhagic enteritis,blood is tarry . spleen enlarged. Petechiae of peritonium and heart, liver and kidneys congested.pericardial sac filled with serosanguineous fluid.

**Differential Diagnosis**

It is differentiated from lightning stroke, BQ, HS, Babesiosis leptospirosis, acute lead poisoning, acute bloat and snake bite. If suspected from anthrax does not open carcass. First of all, the blood smear must be made from the bloody discharge of the tip of ear that is on the lower side. It stains Leishman stain or by methylene blue. Anthrax bacilli must be distinguished from postmortem invaders. Postmortem invaders – long chains of bacilli noticed.

