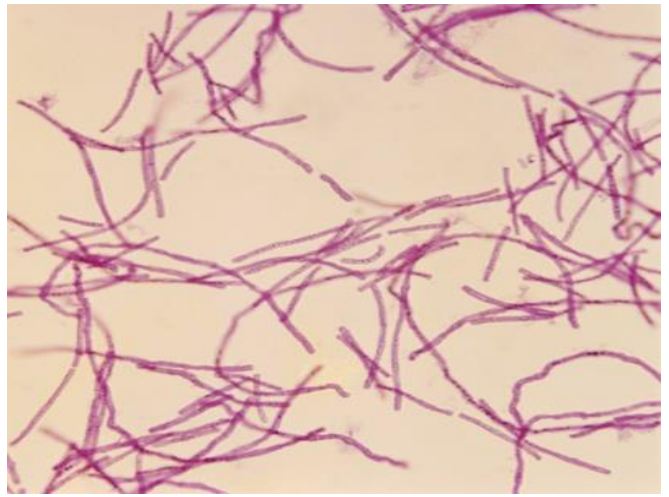
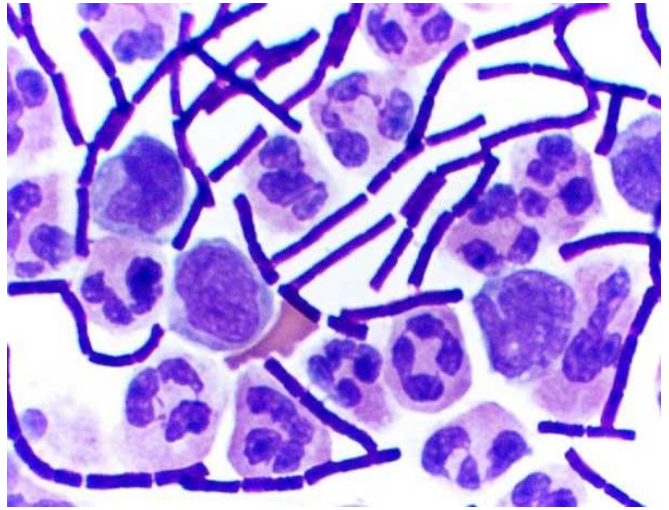
ANTHRAX

State Surveillance Unit, IDSP, West Bengal

What is Anthrax

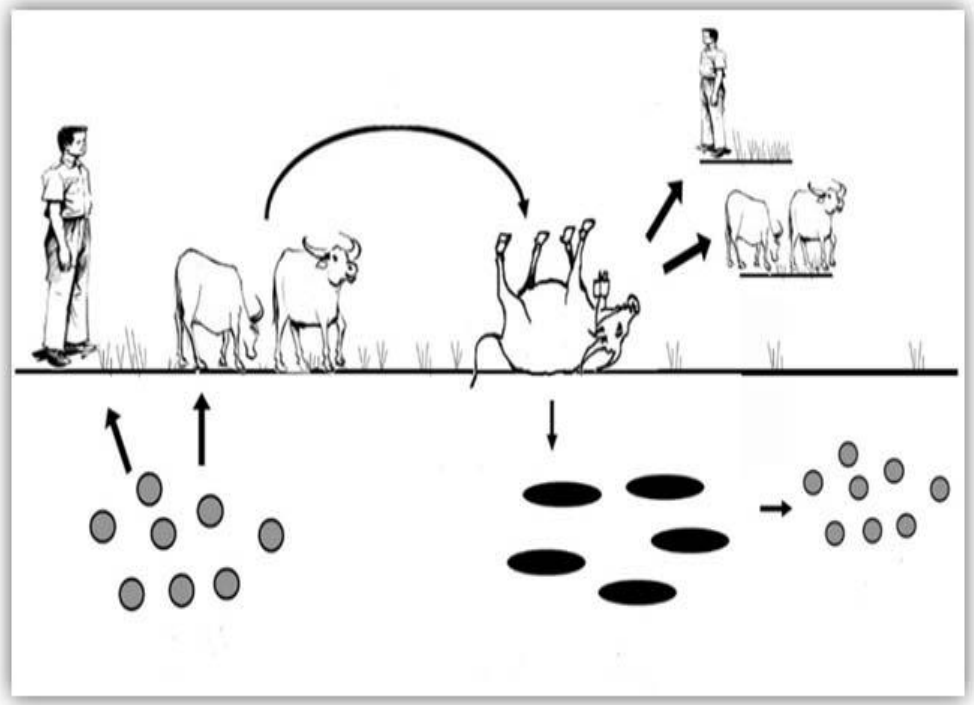
- Anthrax is also known as Malignant pustule, Malignant oedema, Wool sorter's disease, Tarka.
- One of the oldest recorded disease of animals.
- Primarily a disease of herbivorous animals (cattle, sheep, goats horses and wild herbivores).
- Occasionally affects human (incidental).
- Caused by a bacteria *Bacillus anthracis* -a Gram +ve, rod shaped, non motile and non acid fast bacteria.
- Anthrax transmit by the sporulated form of the bacilli and not the vegetative form.



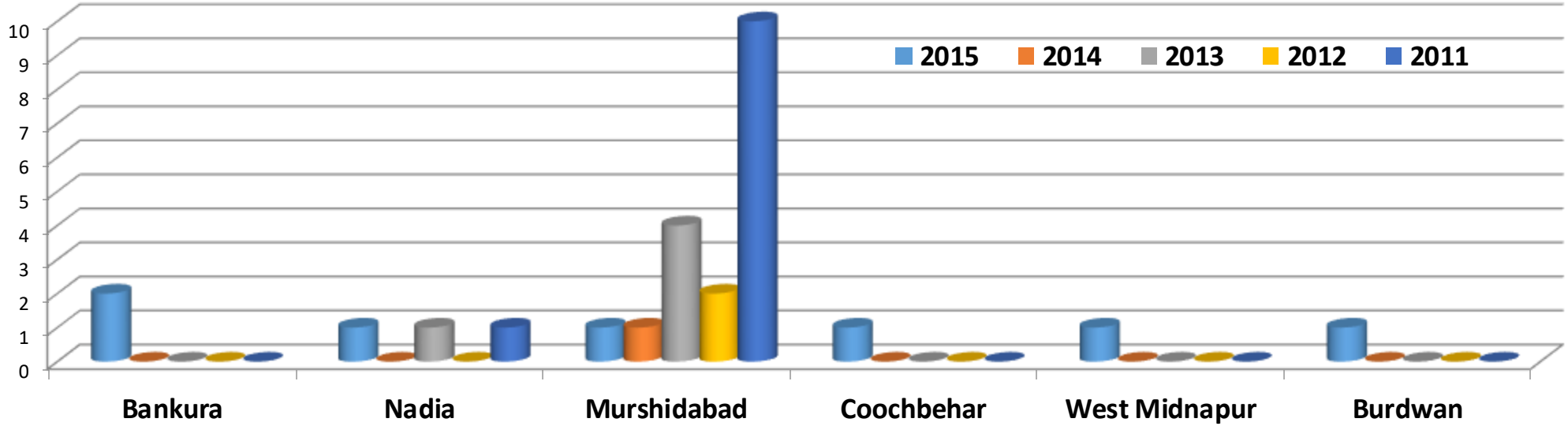


Spore of *Bacillus anthracis*

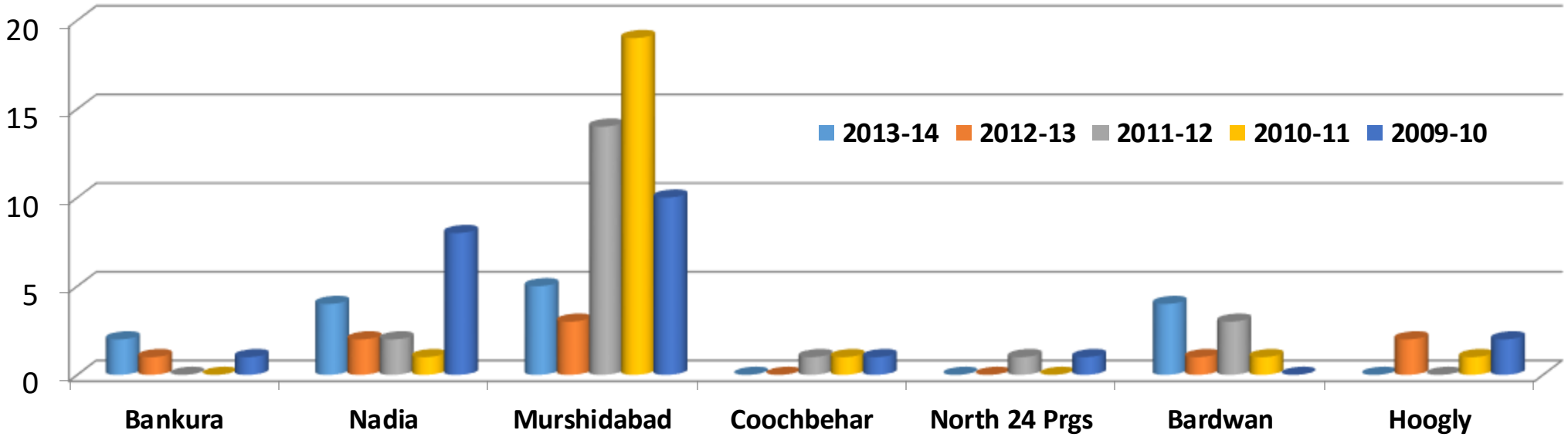
- Infected animals shed the bacilli during bleeding from natural orifices, or if the blood of the dead animal is spilled accidentally.
- On exposure to the air the vegetative forms sporulate.
- Spore forms are predominant in the environment.
- Spores remain viable in the soil for decades.
- Soil serve as reservoir of anthrax bacilli.
- Dried or processed skins of infected animals may harbour the spores for years.
- Spores are resistant to many disinfectants and adverse environmental conditions
- Human to human or animal to animal transmission is rare.



District wise Anthrax outbreak in human in West Bengal, 2011-2015

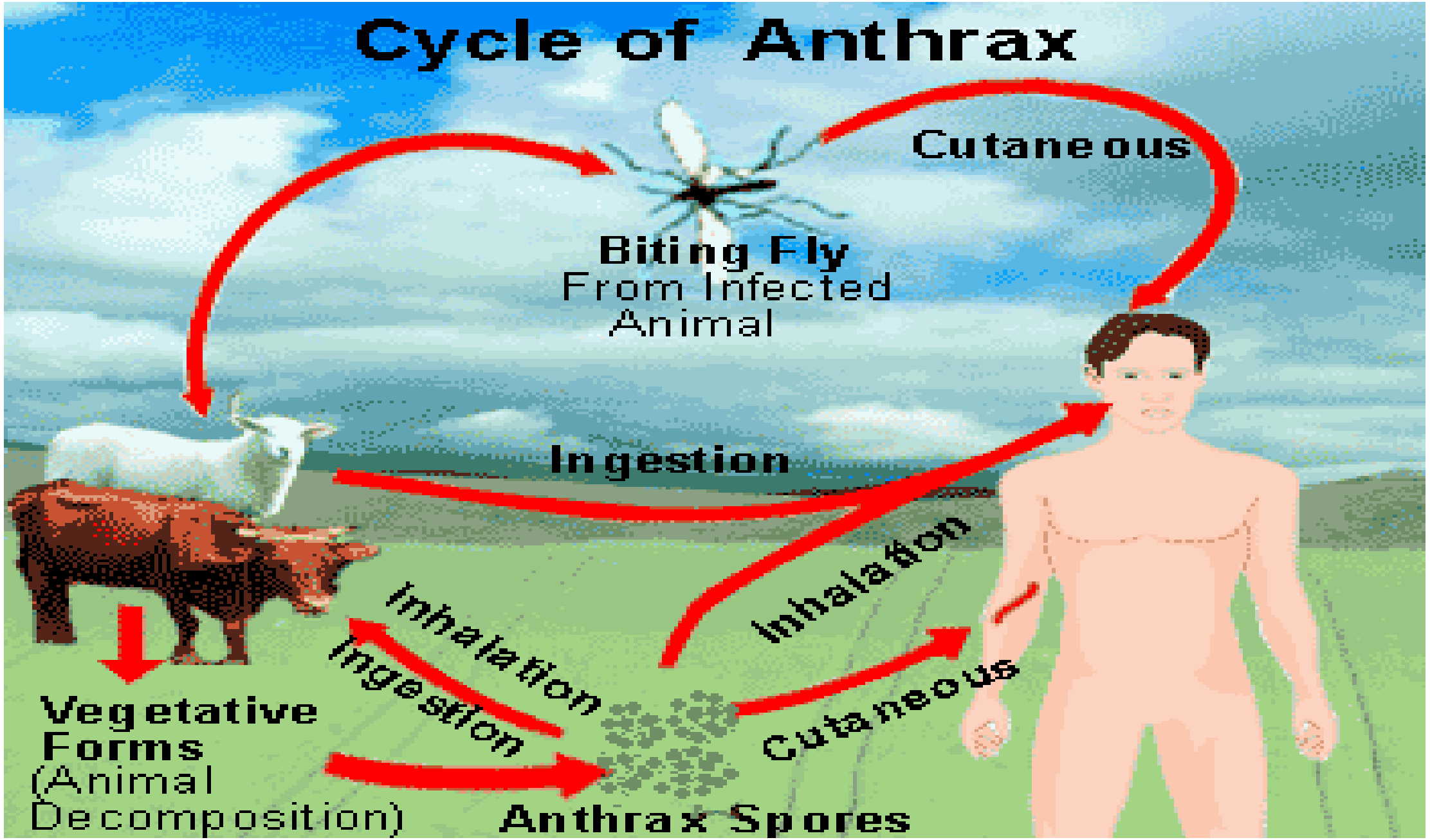


District wise Anthrax outbreak in animal in West Bengal, 2009-10 to 2013-14



Transmission

ANIMAL	HUMAN
1. Cutaneous : ➢ Mechanical (insect bite) ➢ Vultures have been reported to spread the organism from one area to another.	**1 Cutaneous anthrax :** ➢ Most common in our state ➢ After exposure to infected animals and contaminated animal products such as hair, hides, wool, bones, or skin. ➢ Biting fly from infected animal.
2. Inhalation : Least common	**2. Inhalation anthrax :** ➢ Inhalation of spores. Aerosols of such particles may be created by the agitation of the hair or wool in the industry settings.
3. Ingestion – Most common ➢ Contaminated soil or feeds. ➢ Heavy rain, drought. ➢ Omnivores and carnivores through contaminated meat, bone meal and other feeds ➢ Among wild life from feeding on anthrax carcasses.	**3. Intestinal anthrax :** ➢ Results from ingestion of contaminated meat. ➢ Incubation period - few hours to 7 days. Most cutaneous anthrax (by biting flies) occur within 48 hours of exposure


Cycle of Anthrax
Cutaneous
Biting Fly
From Infected
Animal
Ingestion
Inhalation
Inhalation
Ingestion
Cutaneous
Vegetative
Forms
(Animal
Decomposition)
Anthrax Spores

Clinical signs of Anthrax in Animal

- Many species of animal affected , Ruminants at greatest risk
- Three forms in animal

Peracute Form	Acute form	Sub acute Form
➢ Species-Cattle, sheep, goat, antelope ➢ Animals may be found dead without any premonitory signs	➢ Ruminants & equine ➢ High body temperature, animal become distress and cease eating and drinking. There is formation of bloat. ➢ With the advancement of disease process there is development of muscular tremor. ➢ At 'the end, animal shows distressed breathing. ➢ Death usually takes place within 48 hours. Following death there is oozing of blood from all the natural orifices.	➢ Pigs, carnivores and primates ➢ Local oedema and swelling of face and neck or of lymph nodes particularly mandibular and pharyngeal and/or mesenteric nodes may be present.

Clinical Signs of anthrax in Animal…(Cont'd)

Clinical signs of Anthrax in Human

➢ Cutaneous anthrax

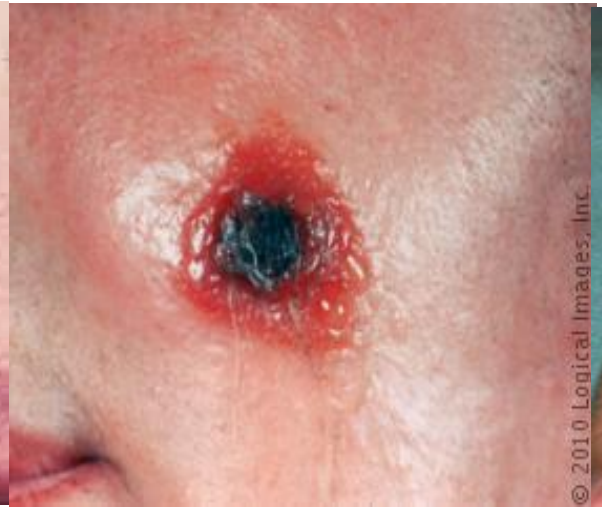
Most common form. The majority of anthrax cases (up to 95%) are Cutaneous.

- The incubation period is 1-7 days.
- Skin infection begins as a painless, pruritic papule that resembles an insect bite but within 1-2 days develops into a vesicle (usually 1-3 cm in diameter) and then a painless ulcer with a characteristic black necrotic (dying) area in the centre.
- Systemic symptoms are mild and may include malaise and low-grade fever.
- There may be regional lymphangitis and lymphadenopathy.
- Occasionally more severe form of cutaneous anthrax may occur with extensive local oedema, induration and toxaemia. The infection can also spread to the bloodstream with overwhelming septicaemia.
- About 5-20% of untreated cases of cutaneous anthrax will result in death.
- Deaths are infrequent with appropriate antimicrobial therapy.

Clinical signs of Anthrax in Human…..cont'd

Different locations and types of lesion of cutaneous anthrax

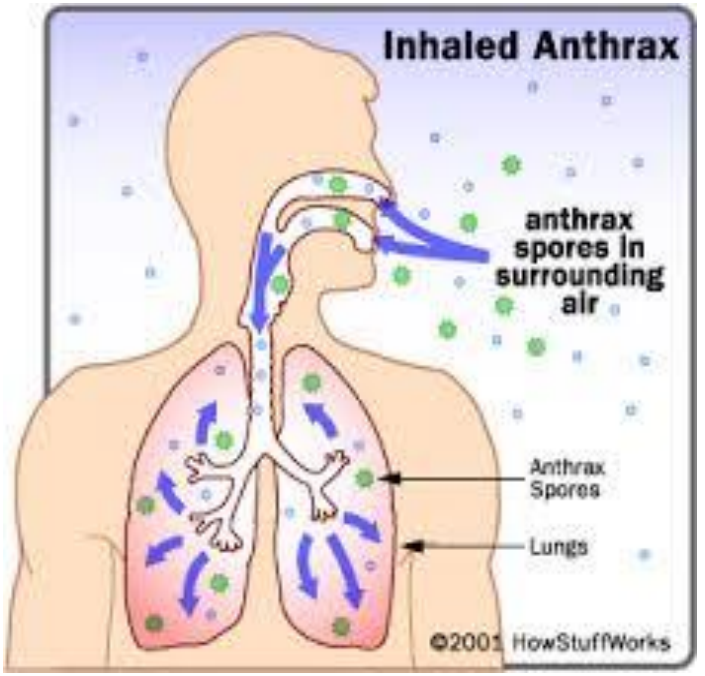




Clinical signs of Anthrax in Human…..cont'd

➢ Inhalation anthrax:

- **Incubation period 1-7 days.**
- Initial symptoms may resemble a common cold.
- May progress to severe breathing problems and hypoxia leading to respiratory failure and shock.
- Death in 1-2 days after onset of the acute symptoms.
- Mortality is 75-90% in untreated cases.



Clinical signs of Anthrax in Human…..cont'd

➢ Ingestion Anthrax :

Incubation period : 3-7 days

Two clinical forms:

- **Intestinal anthrax*:*** nausea, vomiting, fever, abdominal pain, hematemesis, bloody diarrhoea and massive ascites.

  Unless treatment starts early, toxemia and shock develop resulting in death.

  Result in death in 25% to 60% of cases.

- **Oropharyngeal anthrax:**

  Sore throat, dysphagia, fever, lymphadenopathy in the neck and toxemia.

  Even with treatment mortality is high, about 50%.

Recommended Case Definition for human

- **Suspect:** A case that is compatible with the clinical description and has an epidemiological link to confirmed or suspected animal cases or contaminated animal products.
- **Presumptive:** A suspected case where
  - The clinical specimen in culture shows typical characteristic; or
  - In smear short chain of capsulated bacilli are seen when stained with polychrome methylene blue.
- **Confirmed:** A suspected case that is laboratory confirmed by one or more of the following:
  - Where it shows encapsulated, non-motile, non-haemolytic gram positive bacilli susceptible to penicillin and the isolate is susceptible to gamma phage lysis.
  - PCR confirming presence of toxin and capsule genes.

Source: Guideline for Prevention and Control of Anthrax. Zoonosis Division, NCDC. 2006

Collection of Specimen (Human Anthrax)

- **Cutaneous anthrax:**
  - In early stage vesicular exudate by swabs and capillary tube aspirate
  - In later stage swab from underneath the eschar after lifting up the eschar
- **Ingestion anthrax:**
  - Stool sample – if patient is not severely ill
  - Ascitic fluid (peritoneal fluid) –if patient is severely ill
- **Inhalation anthrax:**
  - Sputum, serum samples for antibody
  - Gastric lavage -In severely ill children

Case Management

Antibiotics are effective if the disease is recognized early and the full recommended dose and course of the antibiotic are completed; otherwise the disease can be fatal.

General measures for treatment of shock are also necessary.

Treatment of Cutaneous anthrax:

1. Ciprofloxacin 500 mg BD orally for 10days or
   Doxycycline 100 mg BD orally for 10 days or
   Amoxicillin 500 mg TDS orally for 10 days
2. Oral penicillin V 500 mg 6 hourly or
   Procaine penicillin 1 million unit 12 to 24 hourly by IM route
3. Chloramphenicol, Rifampicin, Erythromycin, Clindamycin or Clarithromycin may also be given.

Source: Guideline for Prevention and Control of Anthrax. Zoonosis Division, NCDC. 2006.
Treatment of Inhalation and ingestion anthrax is available in the guideline at https://www.wbhealth.gov.in/.

Guidelines for an effective control of anthrax

❖ Surveillance :

The primary objectives of any anthrax surveillance system are:

(1) to prevent or reduce livestock losses and

(2) to prevent human disease.

- Monitoring the incidence of the disease in both animal and human populations.
- All unexplained livestock deaths or suspected human and animals cases must be investigated with laboratory support.
- In animals, biological samples should be collected with the help of veterinarian.

❖ Reporting :

- Mandatory reporting of sudden deaths among livestock.
- Mandatory reporting of all human cases.

Guidelines for an effective control of anthrax…..cont'd

❖ Vaccination

- All high risk groups (Veterinarians, butcher, person working in hide, wool and bone meal industry, Zoo keeper, Wild life workers, Forest guards) should be vaccinated if their exposure is frequent and if the human vaccine is available.
- Immunise all animals at risk and re-immunise annually.

❖ Proper Disposal of carcasses

- After confirmation as being a case of anthrax, a carcass should not be opened and should be disposed of by incineration or deep burial.
- It should be done under supervision of a Veterinarian.
- Necropsy should not be done, as this has the risk of spread of the infection.

(Detailed method of proper disposal of carcasses is available in https://www.wbhealth.gov.in/)

Guidelines for an effective control of anthrax…..cont'd

❖ Disinfection and Decontamination :

- Disinfectants should be available in reasonable quantities.
- Decontaminate soil seeded by carcasses with 5% formaldehyde after disposal of the carcass.

❖ Education /Awareness Campaign :

- Education of those who will be involved in the surveillance system and those who own or handle livestock, meat, hides and other animal products – about modes of anthrax transmission, care of skin abrasions and personal cleanliness.
  - Control dust and properly ventilate all hazardous industries particularly which handle raw animal materials.
  - Handle of animals properly in slaughter houses, tanning industry etc.
  - Treat properly the effluents from hazardous industries handling animals etc.
- Not to kill sick animals for consumption. Proper cooking of meat products.
- Do not use/sell hide of animals exposed to anthrax nor use their carcasses to make feed supplement.

Guidelines for an effective control of anthrax…..cont'd

❖ Treatment :

Control of anthrax among humans depends on the integration of veterinary and human health surveillance and control programmes.

- All symptomatic animals are to be treated.
- Vaccinate after cessation of treatment.

❖ Inter-sectoral Coordination :

Control of anthrax among humans depends on the integration of veterinary and human health surveillance and control programmes.

- Routine cross-notification between the veterinary and human health surveillance systems is needed.
- Close collaboration between the two health sectors is particularly important during epidemiological and outbreak investigations.
- Inter-sectoral cooperation is important in areas where wildlife areas abut with livestock areas, or where wildlife and livestock intermingle.

Actions to be taken in the event of an outbreak of anthrax

Every effort is to be made to investigate the outbreak, to confirm through laboratory diagnosis and to search for the source.

In the affected area, the following measures must be applied:

- Proper disposal of anthrax infected carcasses.
- The site where the animal died is to be disinfected with 5% formaldehyde after disposal of the carcass.
- All other animals in the affected herd are to be vaccinated.
- All cattle of neighbouring premises should be vaccinated.
- Affected premises are to be quarantined for at least 3 weeks after the last case.
- A buffer zone, 20-30 Km wide, is to be established around the infected area within which all cattle are to be vaccinated and quarantined.
- Any milk collected from a cow, buffalo or goat showing signs of anthrax within 8 hours of milking is to be destroyed, along with any other milk that may have been mixed with the suspected milk.

Actions to be taken in the event of an outbreak of anthrax…. Cont'd

Personal Protection For Human

- People entering infected premises are required to wear protective clothing and footwear, which are disinfected before leaving the premises.
- Such persons should avoid any contact with other persons or animals without first changing clothing, washing hands and taking appropriate disinfection measures.
- Where there is a risk of aerosolization of spores, further precautions should be considered such as damping down the material, possibly with 5% formalin, wearing face masks etc.
- **Chemoprophylaxis for exposed person:**

Asymptomatic exposed individuals are to be put on a four week course of doxycycline 100 mg twice daily or ciprofloxacin 500 mg twice daily.


Thank you