

CLASSIFICATION, CAUSES, SIGNS AND SYMPTOMS ,PREVENTION,TREATMENT OF  
THE DISEASES CAUSED BY “ANAEROBIC ORGANISMS”.

A SEMINAR PRESENTED BY  
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TO THE  
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**Anaerobic organisms:** An anaerobic organism or anaerobe is any organism that does not require oxygen for growth. It may react negatively or even die if free oxygen is present. Anaerobes may be unicellular or multicellular. Anaerobic bacteria grow in places where there is little or absence of oxygen. Anaerobic bacteria do not grow on solid media in room air. These bacteria are naturally occurring and plentiful in and on the body. They are the most common flora in the body. They don't cause infection in their natural state, but can cause infection after injury or trauma to the body.

Anaerobes get killed in the presence of free oxygen, as a result of the accumulation of hydrogen peroxide on their cell surfaces except some of the anaerobes which are aero tolerant.

Anaerobic bacteria usually do not possess catalase, but some can generate superoxide dismutase which protects them from oxygen.

## **CLASSIFICATION OF ANAEROBIC BACTERIA**

- **Obligate anaerobes**; are microorganisms killed by normal atmospheric concentrations of oxygen . Oxygen tolerance varies between species, some capable of surviving in up to 8% oxygen.

Examples of

anaerobic bacterial genera include *Actinomyces*, *Bacteroides*, *Clostridium sp.*,  
, *Fusobacterium etc.*

- **Aero tolerant anaerobes:** They use fermentation to produce ATP. They do not utilize oxygen, but they can protect themselves from reactive oxygen molecules. i.e. they cannot use oxygen for growth, but tolerate its presence. An example of an aero tolerant anaerobe is *Streptococcus mutans*.

▪ **Facultative anaerobe:** is an organism that makes ATP by aerobic respiration if oxygen is present, but is capable of switching to fermentation if oxygen is absent.

Some examples of facultative anaerobic bacteria are; *Staphylococcus* spp., *Streptococcus* spp., *Escherichia coli*, *Salmonella* etc.

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## **Anaerobic infections**

Anaerobic infections are common infections caused by anaerobic bacteria. These bacteria occur naturally and are the most common flora in the body. In their natural state, they don't cause infection. But they can cause infections after an injury or trauma to the body.

Anaerobic infections commonly affect the;

- abdomen
- genitals
- heart
- bones
- joints
- central nervous system
- respiratory tract
- skin
- mouth
- These infections can be difficult to treat. Common anaerobic infections include:
  - appendicitis
  - abscess (brain, abdominal, lung, liver, and tub ovarian)

tetanus

pneumonia

## **CAUSES**

Anaerobic infections can happen when deep tissues become injured or exposed. This can occur due to trauma such as animal bite or surgery.

Your risk is higher if you have:

low blood supply

open wounds, which can easily become infected

diabetes

a weak immune system

## Symptoms

Common symptoms of an anaerobic infection include:

- noticeable infection near the skin
- smelly discharge from the genital tract
- pus-filled abscess



- tissue damage
- discoloration of the infected area

Infection in the mouth or throat can also cause tender gums, bad breath, or pain. Infection in the lungs can also cause chest pain or coughing. And infection of the skin can also cause pain, redness, or swelling.

## **CULTIVATION OF ANAEROBIC BACTERIA**

Main Principle: reduction of the oxygen content of culture medium and removal any oxygen already present inside the system or in the medium.

Oxygen is ubiquitous (existing everywhere) in the air so special methods are needed to culture anaerobic microorganisms. A number of procedure are available for reducing the oxygen content of culture. some simple but suitable methods are mainly

for less sensitive organisms, others more complex but necessary for growth of strict anaerobes.

- Bottles or tubes filled completely to the top with culture medium and closed with tightly fitted stopper. Suitable for organisms not too sensitive to small amounts of oxygen.
- Addition of a reducing agent that reacts with oxygen and reduces it to water e.g., Thioglycolate in thioglycolate broth.

Strict anaerobes can be grown only by taking special precautions to exclude all atmospheric oxygen from the medium. This can be achieved through the following methods;

## **PRE REDUCED MEDIA**

During preparation, the culture medium is boiled for several minutes to drive off most of the dissolved oxygen. A reducing agent is added to further lower the oxygen content. Oxygen free  $N_2$  is bubbled through the medium to keep it anaerobic. The medium is then dispensed into tubes and tightly closed

## **Anaerobic Chamber**

This refers to a plastic anaerobic glove box that contains an atmosphere of  $H_2CO_2$  (formic acid) and  $N_2$ . Culture media are placed within

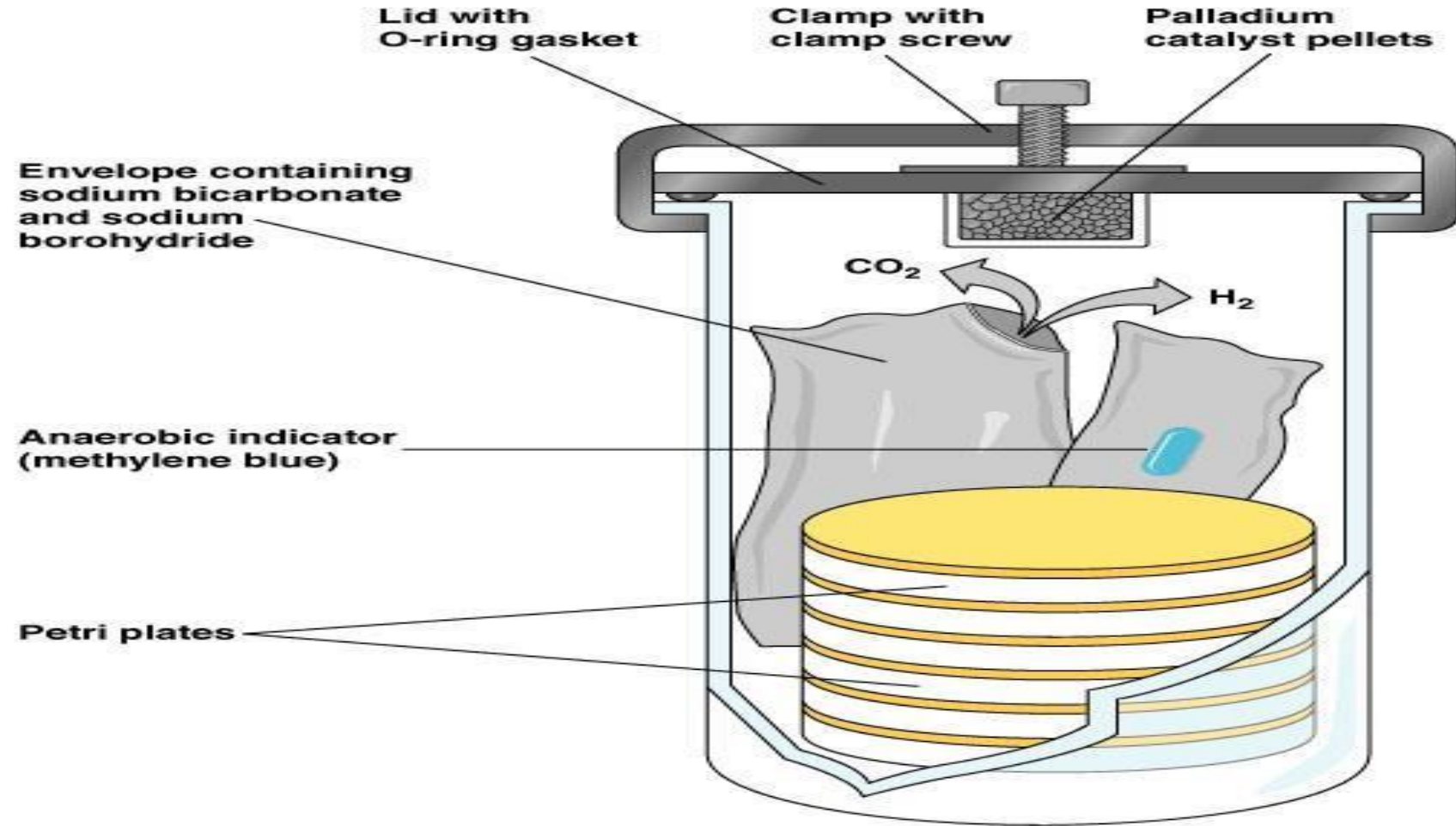
the chamber. Any oxygen in the media is slowly removed by reaction with hydrogen, forming water; this reaction is aided by a palladium catalyst, rendering the chamber oxygen free.



### **Anaerobic Jar: Gas Pak system**

Anaerobic jar is a heavy- walled jar with a gas tight seal within which tubes, plates, or other containers to be incubated are placed along with  $H_2$  and  $CO_2$  generating system. After the jar is sealed oxygen present in the atmosphere dissolved in the culture medium, is gradually used

up through reaction with the hydrogen in the presence of catalyst.



**ANEROBIC JAR.**

- **TREATMENT**

- Anaerobic infections are usually treated with antibiotics and other medications. The antibiotic you receive depends on the type of infection you have and the bacteria that likely caused it. For infections in your mouth, throat, or lungs, your doctor may give you:

- clindamycin
- amoxicillin
- clavulanate
- metronidazole

- If you have an infection in your gastrointestinal (GI) tract or your pelvic area, which is most common in women, your doctor may give you:

- moxifloxacin
- metronidazole

- Drainage of pus is also necessary to treat the infection. The infection or abscess may need to be surgically removed in some cases
- Then, your doctor will make sure that blood is circulating normally to the area. They will look for anything blocking your tissues from healing. They will also monitor the area until it's free of infectious bacteria and functioning normally.

- **PREVENTING ANAEROBIC INFECTIONS**

- See your doctor as soon as you notice symptoms of an infection anywhere on or inside your body. Getting treatment for minor infections can help prevent the spread of bacteria.

- Anaerobic infections in the lungs and mouth can be prevented in a variety of ways, including:
  - maintaining excellent oral hygiene, such as brushing
- You can help prevent anaerobic infections on your skin and soft tissues by taking proper care of cuts as soon as they occur.
- Your doctor may also give antibiotics before surgery to prevent bacteria from infecting your blood. Taking a drug before surgery also prevents any anaerobic infections from occurring around the area being operated on.



# SUMMARY

An anaerobic organism or anaerobe is any organism that does not require oxygen for growth. It may react negatively or even die if free oxygen is present. Anaerobic bacteria grow in places where there is little or absence of oxygen. Anaerobic bacteria do not grow on solid media in room air. These bacteria are naturally occurring and plentiful in and on the body. They don't cause infection in their natural state, but can cause infection after injury or trauma to the body. Anaerobes get killed in the presence of free oxygen, as a result of the accumulation of hydrogen peroxide on their cell surfaces except some of the bacteria which are aero tolerant. They are classified into; obligate, facultative and aero tolerant. Anaerobic infection occurs when deep tissues becomes injured or exposed they can also occur due to surgery or trauma. Signs and symptoms includes smelly discharge, pus filled abscess, tissue damage, discoloration of skin etc. Anaerobic infection can be treated with antibiotics depending on the types of infection. Infections caused by anaerobes includes; appendicitis, tetanus, pneumonia etc. it is being diagnosed through the signs and symptoms. Methods of cultivation includes; addition of reducing substance, anaerobic chamber, anaerobic jar etc.

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