Genus: *Haemophillus*

Morphology

This is a group of small, non motile, Gram-negative, coccobacillus, pleomorphic bacteria (**in microbiology, pleomorphism is mean the ability of some microorganisms to alter their morphology, biological functions or reproductive modes in response to environmental conditions)**.

It is generally aerobic, but can grow as a facultative anaerobes that require enriched media, containing blood or its derivatives.

Haemophillus influnzae

Haemophilus influenzae is found on the mucous membranes of the upper respiratory tract, in nose or throat in humans. If the bacteria can move to other parts of the body, it can cause infections , usually causes upper and lower respiratory tract infections in children and in adults.

Haemophilus influenzae could be isolated in encapsulated and un-encapsulated forms, identified six capsular types (a–f), and observed that all isolates from cerebrospinal fluid (CSF) and blood were of the **capsular type b**.

Before the introduction of effective vaccine, ***Haemophilus influenzae* type b** (Hib) was the leading cause of bacterial meningitis and other invasive bacterial disease among unvaccinated children younger than 5 years of age.

Satellite or satellitism phenomena

Haemophilus influenzae , *in vitro* growth requires accessory growth factors, including "X" factor (hemin) and "V" factor (nicotinamide adenine dinucleotide_ NAD) needs both factors, for its growth.

So, *Haemophilus* spp. typically grows on chocolate agar that provides both (X factor) and (V factor) necessary for its growth, while most of species of *Haemophillus* are not grow on 5% sheep blood agar which contain hemin (X factor), but lack NAD (V factor).

Staphylococcus aureus produce NAD as a metabolic byproduct when grow in a culture media contain blood, therefore *Haemophillus* spp. may grow on blood agar very close to the colonies of *Staphylococcus aureus* (as it produce NAD or V factor) which diffuses into the surrounding medium and enhances growth of *Haemophilus* in the proximity of the *Staphylococcus* colony. The hemolysis of erythrocytes by *Staph. aureus* release nutrients vital to the growth of *Haemophillus*. This phenomena is known as satellitism.

Transmission

Haemophilus influenzae spread from patients to others by respiratory droplets through cough or sneeze. People (carriers) who are not sick but have the bacteria in their noses and throats can still spread the bacteria.

Pathogenicity

Haemophilus influenzae type b can cause many different kinds of infections. These infections usually affect children under 5 years of age, but can also affect adults with certain medical conditions. Hib bacteria can cause **mild illness**, such as **ear infections or bronchitis**, or they can cause **severe illness**, such as infections of the **bloodstream** and **meningitis** is an infection of the lining of the brain and spinal cord. It can lead to **brain damage and deafness**.

Severe Hib infection, also called invasive Hib disease, requires treatment in a hospital and can sometimes result in death.

Hib infection can also cause:

- Pneumonia.
- severe swelling in the throat, making it hard to breathe.
- infections of the blood, joints, and bones.

Laboratory diagnosis

The laboratory diagnosis of *Haemophilus influenzae* is based on growth and **colony morphology** in **chocolate agar**, and cell morphology on **Gram staining**.

These are confirmed by the haemophilic character of the genus that reflects a requirement for the **X** and **V** factors.

In specimens of blood or cerebrospinal fluid that isolated from acute infections, the organisms are short coccoid bacilli, sometimes occurring in pairs or short chains. In cultures, the morphology depends both on the **length of incubation period** and on the **medium**. At 6–8 hours in rich medium, the small coccobacillary forms predominate. Later, there are longer rods and very pleomorphic forms.

Treatment

In severe cases, cefotaxime and ceftriaxone delivered directly into the bloodstream are the elected antibiotics, and, for the less severe cases, an association of ampicillin and sulbactam, cephalosporins of the second and third generation, or fluoroquinolones are preferred.

Macrolide antibiotics (e.g., clarithromycin) may be used in patients with a history of allergy to beta-lactam antibiotics.

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