

## *Haemophilus influenzae*

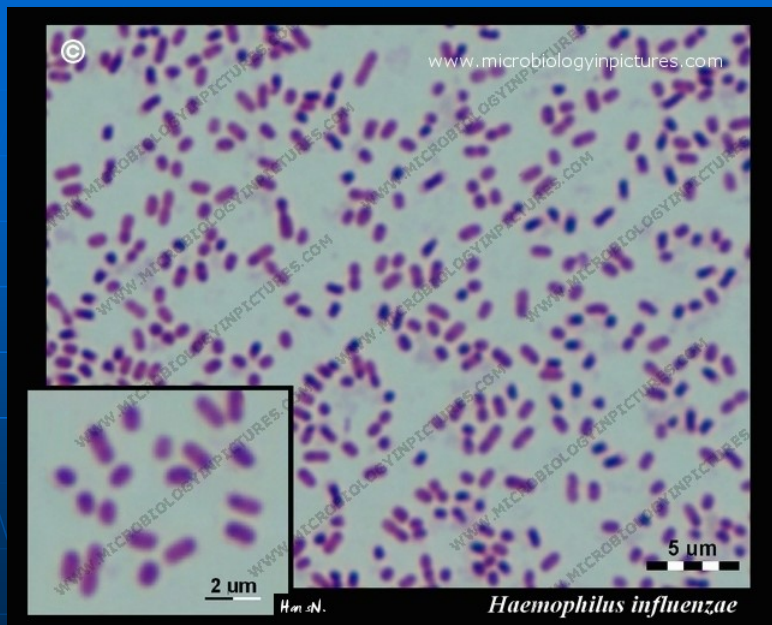


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- The genus *Haemophilus* organisms are small gram negative cocco-bacilli
- Some strains are capsulated.
- The commonest is *Haemophilus influenzae*.
- The other species of the genus *Haemophilus* include *H. ducreyi*

## Properties:

- A facultative anaerobe which grows best in media enriched with  $\text{CO}_2$ .
- Has got a polysaccharide capsule.
- On the basis of type of capsule there are six serotypes numbered as a,b,c,d,e and f.
- **Serotype b** is most virulent type
- Organism found only in humans.



**Q:** Which **serotype** is the most virulent type of *Haemophilus influenzae* ?

A- **serotype** a

B- **serotype** b

C- **serotype** c

D- **serotype** d

E- **serotype** e

F- **serotype** f.

■ **Pathogenicity:**

- Enters the body through respiratory tract
- Two types of behaviors.

**1.** Asymptomatic colonization

**2.** Infections such as sinusitis, otitis media or pneumonia.

- Organism produces IgA protease which neutralizes respiratory mucosal IgA.
- This helps in its attachment to respiratory mucosa.

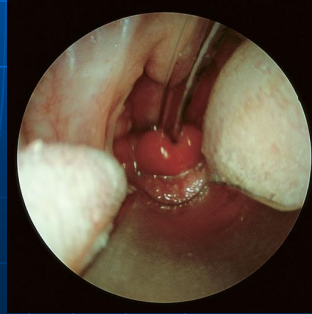
**Q: Which of the following virulence factor helps *H. influenzae* in its attachment to respiratory mucosa?**

- A) Capsule
- B) Hemolysin
- C) Endotoxin
- D) IgA protease

- After attachment to respiratory mucosa it can enter blood stream and cause Bacteremia and meningitis.
- 95% of type b are responsible for these diseases.
- Non capsulated forms are responsible for otitis media, sinusitis and pneumonia.
- In children the age group 6 months -6 years is most prone to infection by the organism.
- Peak incidence is from 6 months- 1 year.

### ■ Clinical features:

1. Meningitis is same in features to that caused by meningococcus and *pneumococcus*
2. Otitis media and sinusitis cause pain in affected areas and redness and bulging of tympanic memb.
3. Septic arthritis, and sepsis (in splenectomized patients).
4. Rarely epiglottitis in young children.



### ■ Lab diagnosis:

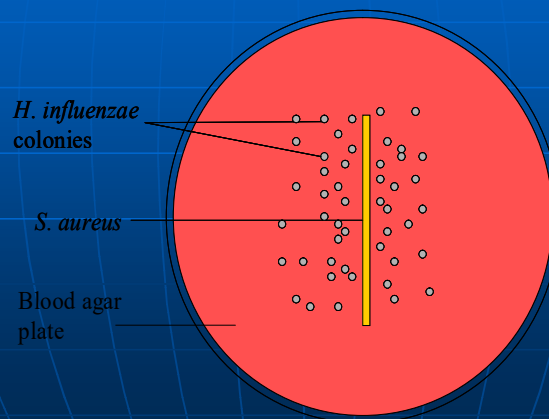
- Gram staining
  - Organism is grown on **chocolate agar**.
  - Chocolate agar is enriched with two factors.
    1. Factor **X** (haematin)
    2. Factor **V** (NAD).
  - Other species do not require both factors
- The colonies will be greyish-white, small and mucoid.

**Q: The selective agar medium for isolation of *H. influenzae* is:**

- A- Blood agar
- B- Chocolate agar
- C- Chocolate agar supplemented with X & V factors
- D- EMB agar
- E- MacConkey agar

V- factor can be produced by *S. aureus*  
*H. influenzae* can grow on blood agar in vicinity of colony of *S. aureus* (**satellitism**).

#### SATELLITISM BY *H. INFLUENZAE*





- Definitive diagnosis can be made with Quellung test
- Additional means of identifying encapsulated strains include **fluorescent-antibody staining** of the organism which detect the capsular polysaccharide.

- **Treatment:**

- Ceftriaxone is drug of choice in meningitis and other serious infections
- Otitis media and sinusitis are treated with co-amoxiclav.

- **Prevention:**

- It is by vaccination (purified PRP - polyribitol phosphate- vaccine)
- The vaccine given is called **Hib**
- It is in conjugated form. Conjugated with a carrier protein.