Haemophilus

- “ **Blood – loving”**

Because they cannot grow on culture media unless whole blood or certain of its components are present.

Haemophilus

- **Major pathogen is *H.influenzae*.**
- **Other species are**

  ***H. aegiptius* – conjunctivitis**

  ***H.ducreyi* – causes chancroid**

Morphology

- **They are Gram negative, pleomorphic rods.**
- **Some produce polysaccharide capsules.**
- **These represent six antigenic types a-f**

- **Most important one is type b.**
- **Strains containing the type b capsule (Hib) are associated with most invasive infections.**

Growth on laboratory media

- **Growth depends on two factors, X and V**
- **X factor is haemin**
  - **for the synthesis of cytocrome *c* and other iron containing respiratory enzymes**

- **V factor is NAD (Nicotinamide Adenine Dinucleotide) or NADP**
- **- essential for oxidation – reduction process in cell metabolism**

- **Ordinary blood agar contain X and V factors, but growth is poor due to lack of V factor.**

- **This can be supplemented by streaking *Staphylococcus aureus, which produce excess of V factor***

Blood agar also contain serum NADase

This can be inactivated by heating blood agar for few minutes at 70-80^{o}C

- **Chocolate agar or heated blood agar**
- **Also liberates extra X and V factors inside the RBC**

H.influenzae

- **Invasive diseases**

  meningitis,

  epiglottitis,

  pneumonia,

  septic arthritis,

  bronchitis and

.

- **Non-invasive diseases**

  Otitis media

  Sinusitis

  Conjunctivitis

Laboratory diagnosis

- **Direct examination**
- **Blood culture**
- **Antigen detection**
  - **type b polysaccharide antigen**
- **Molecular techniques**
  - **PCR**

- ***H.influenzae*** **require both X and V factors**
- ***H.parainfluenzae*** **require V factor only**
- ***H.ducreyi*** **require X factor only**

Treatment

- Sensitive to wider range of antibiotics
- Ampicillin or amoxycillin
- Chloramphenicol
- Cephalosporins such as ceftriaxone and cefotaxime

Control

- **Active immunization - Hib**
  2, 4, 6 & 18 months

Bordetella

- ***Bordetella pertussis*** **is the most medically important species**
- **Causes Pertussis or "Whooping cough"**
- ***Bordetella parapertussis*** **causes a milder form**

Laboratory characteristics

- **Short Gram negative bacilli**
- **For culture, special enriched medium required**
- **medium is charcoal blood agar**
- **After three or more days incubation at 35^{o}C in a moist aerobic atmosphere, yields “mercury drops” like colonies**

Further identification

- **Molecular tests (Nucleic acid amplication by PCR**
- **Serotyping based on surface antigens (agglutinogens) 1 – 6 are recognized**

Pathogenicity

In “whooping cough”, pertussis toxin is a major virulent factor.

Antibiotic sensitivity

Erythromycin

Control

- by vaccination in the Expanded Programme of Immunization (EPI)

- 2, 4, 6 & 18 months

Gardnerella

- **Small Gram variable bacilli, non motile, non-sporing**
- **Facultative anaerobe requiring enriched media, producing small beta-haemolytic colonies**

Pathogenicity

- **Causes bacterial vaginosis**
  (a foul smelling vaginal discharge)
  in association with anaerobes
- **Asymptomatic vaginal carriage is present in about 60% of women**