

Haemophilus and
Other Fastidious
Gram-Negative Bacilli

PART II

HACEK group

- Fastidious gram-negative bacteria that are an unusual cause of infective endocarditis
 - inflammation of the heart due
- HACEK is an abbreviation of the initials of the genera of this group of bacteria:
 - *Haemophilus*, *Aggregatibacter* (previously *Actinobacillus*), *Cardiobacterium*, *Eikenella*, *Kingella*
 - normal part of the human microbiota, living in the oral-pharyngeal region.
- The bacteria were originally grouped because they were thought to be a significant cause of infective endocarditis,
 - recent literature has shown that they are rare and only responsible for 1.4–3% of all cases of this disease.

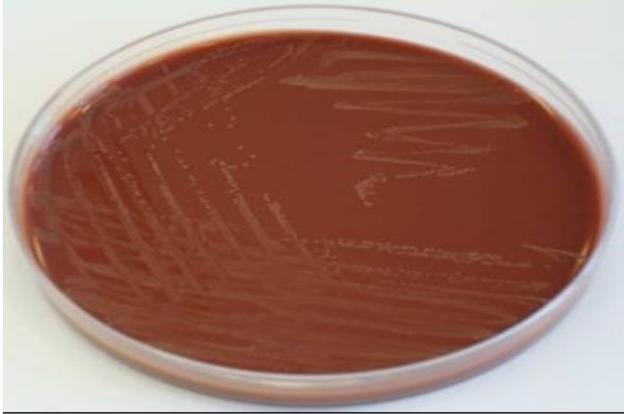
HACEK group

- *Haemophilus sp.*
- *Aggregatibacter (Actinobacillus) actinomycetemcomitans,*
- *Cardiobacterium hominis,*
- *Eikenella corrodens,*
- *Kingella kingae*

HACEK group

- Causes 5-10% community acquired heart valve endocarditis
- Found in upper respiratory tract
- Gram negative coccobacilli
- Slow growing
- It is not unusual for doctors to include notation to specify r/o of HACEK group on blood cultures
 - A person with endocarditis stands a good chance of having positive blood cultures.

Aggregatibacter (Haemophilus) aphrophilus



- Dental plaque and gingival scrapings
- Haemophilus aphrophilus and H. paraphrophilus are combined into one bug.
- May appear to require hemin (X) for growth upon initial isolation but they grow slowly on SBA



Aggregatibacter (Actinobacillus) actinomycetemcomitans

- Small rods to coccoid gram negative bacilli
- Non-motile
- Found as mouth flora in humans
- Isolated from blood, lung tissue, abscesses of mouth and sinuses
- Can cause subacute bacterial endocarditis (SBE)
- Fastidious because it requires increased moisture and CO₂
- Grows on Blood and Chocolate agars
- Does not grow on MacConkey agar

Actinobacillus actinomycetemcomitans

- Ferments glucose, but may require addition of serum
- Distinctive four-to-six-pointed star formation in center of colonies
- Adheres to agar
- Catalase positive
- Previously known as *Aggregatibacter actinomycetemcomitans*



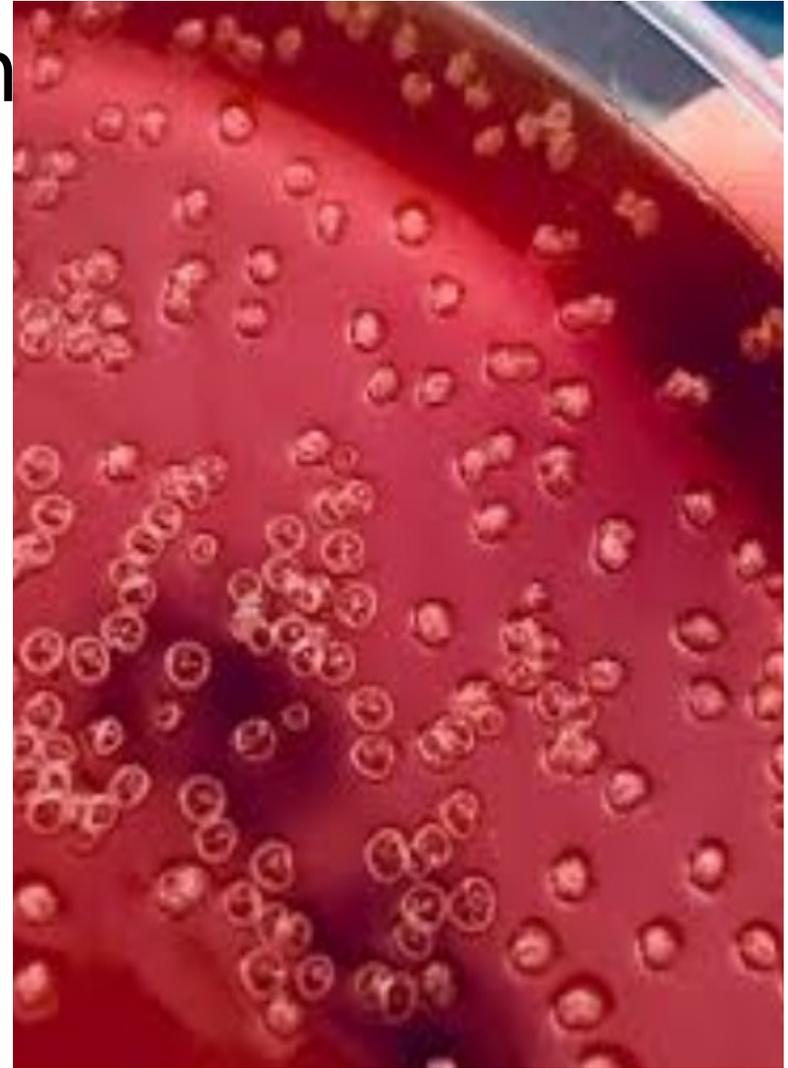
Cardiobacterium hominis

- Pleomorphic, non-motile, fastidious, gram negative bacillus
- Gram stain has a teardrop appearance – one rounded end and one tapered/pointed end
- Tends to form clusters or rosettes on gram stain



Cardiobacterium hom

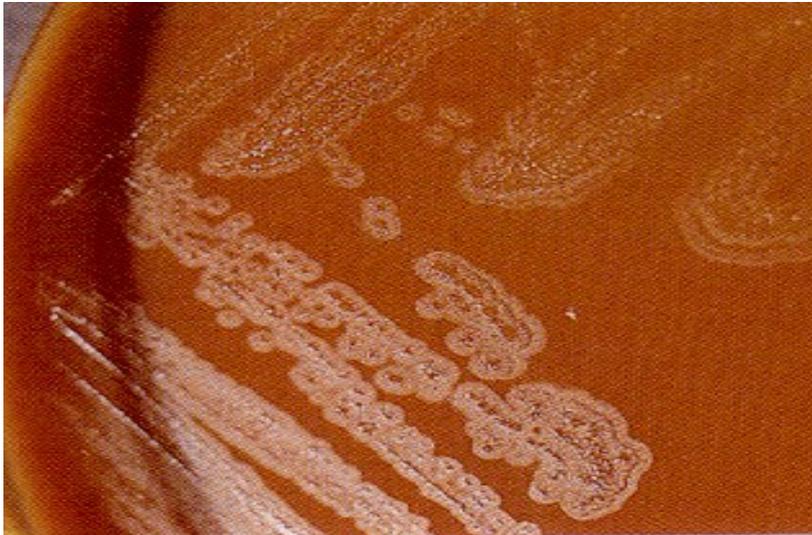
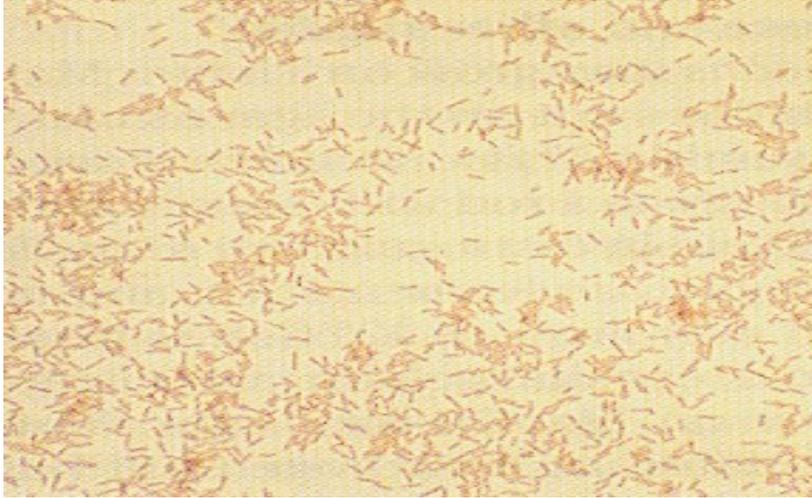
- Requires **increased** CO₂
- Grows best with increased moisture
- Grows on blood and chocolate
 - requires serum to enhance growth
- May cause **pitting** of the agar
- Oxidase **positive**
- Indole **positive**
- Catalase **negative**



Eikenella corrodens

- Normal bowel and oral flora
- Infections
 - “Clenched fist” or reverse bite injury from human bites
 - Meningitis
 - Empyema
 - Pneumonia
 - Osteomyelitis
 - Arthritis
 - Post operative tissue infections
 - Cellulitis (drug users who lick needles)
 - Endocarditis

Eikenella corrodens



- Identification
 - Gram negative coccobacilli
 - Nonmotile
 - Oxidase positive*
 - Catalase negative
 - Yellow pigment (some)
 - Pitting or corroding agar (45%)*
 - Greening of the agar
 - Bleach odor
 - No growth on MacConkey or EMB

Kingella sp.

- Normal upper respiratory flora in children
- *Kingella kingae* can be differentiated from other *Kingella* sp. by beta hemolysis.
- Opportunistic
- Osteomyelitis
- Septic arthritis
- Endocarditis

Kingella kingae

- Gram negative rods with square ends that lie together in pairs or clusters
- Slow, poor growth can make it difficult to recover (may take up to 3 days)
- Often affect bones and joints of seemingly healthy children <4 years of age
- More common thanks to better identification techniques

