Medical Bacteriology- Lecture 18

*Mycoplasma, Chlamydia and Rickettsia*
Mycoplasma

- **Mycoplasma** are the smallest prokaryotes capable of self-replication - (too small to seen under light microscope)
- **Do not have cell wall** - (Don’t stain with a Gram’s stain)
- **Completely resistant to penicillin and cephalosporin and vancomycin**
- It has a high content of sterols to prevent osmotic lysis.
- Part of normal flora of human genital tract or oral cavity of healthy adults
- Grow on media enriched with serum (need cholesterol)
- **Mycoplasma pneumoniae**
- **Route of transmission:** Infected respiratory secretion
- grows in 5-14 days
- Infection is initiated after adherence of bacterial adhesin protein to respiratory epithelial cells (non invasive)
- It is a major cause of pneumonia in young age groups (5-20yrs.)

Fried egg - Colonies of Mycoplasma pneumoniae

Mycoplasma is a unique type of microorganism
Chlamydiaceae

- A family of **obligate intracellular bacteria**. Variable cocci, Gram-negative- do not have peptidoglycan (muramic acid).

- **There are two morphological forms:** elementary body and reticulate body.

- *Chlamydia* infect a wide spectrum of hosts: birds, mammals, and humans.

- **Human infections include:** trachoma, conjunctivitis, various urogenital tract infections of males and females, infant pneumonia

- *Chlamydia trachomatis* (Genital tract infection- Trachoma may cause of blindness)

- **Treatment:** systemic tetracycline, erythromycin; long term therapy is necessary

- *Chlamydia psittaci* (Psittacosis): Parrot Fever or chlamydiosis

- *Chlamydia pneumoniae* (Humans are the only host)

- stain tissues with Giemsa or use a direct fluorescent antibody technique
Chlamydial elementary body and reticulate body.

The small, infectious elementary bodies (EBs) are shown in blue and the larger, replicating reticulate bodies (RBs) are shown in pink. Figure courtesy of K.D. Everett, University of Georgia, Georgia, USA.
**Rickettsiales**

1. **Rickettsieae:** *Rickettsia, Rochalimaea, Coxiella, Orientia*
   - Obligate intracellular, pleomorphic, gram-negative rod to coccoid, stain poorly with gram stain but can be visualized with Giemsa method.
   - Two cell types designated large and small cell variants (LCV and SCV).
   - Both types are infectious.
   - Grow in yolk sac of embryonated eggs, cell culture and laboratory animals.

2. **Ehrlichieae:** *Ehrlichia*
   - Gram negative cocii- obligate intracellular parasite classified in the Rickettsiales, cause (ehrlichiosis), a noncontagious disease known to be transmitted by a tick.

3. **Bartonellaceae:** *Bartonella* (Bartonellosis)
   - Small polymorphic, motile, gram negative bacteria- facultative intracellular parasite. They range in shape from small coccoid and ring-shaped structures to long chains or clusters. Parasites of the erythrocytes of human (adhered to RBCs) where they appear as short rods transmitted by insect vectors such as ticks, fleas
   - *Bartonella* bacteria can be grown on artificial media, unlike rickettsiae.
Rickettsiaceae have groups based on their antigenic structure. The Groups are:

1- Typhus group  
   Epidemic typhus  
   R. prowazekii  
   lice  
   Brill-Zinsser  
   R. prowazekii  
   None  
   Murine typhus  
   R. typhi  
   Rat, flea  
(severe headache, chills, fever, after 4 days, a rash by subcutaneous hemorrhaging as Rickettsia invade the blood vessels).

2- Spotted fever group  
   Rocky mountain spotted fever  
   R. rickettsii  
   Tick  
(severe headache, chills, fever, nausea, rash, Death may occur during the end of the second week due to kidney or heart failure)

   Rickettsialpox  
   R. akari  
   Mite (fever, malaise, headache -usually not fatal)
   Boutonneuse fever  
   R. conorii  
   Tick
   Queensland tick typhus  
   R. australis  
   Tick
   North Asian tick typhus  
   R. sibirica  
   Tick

3- Scrub typhus  
   Orientia tsutsugamushi  
   Mite

4- Q fever  
   Coxiella burnetii  
   Tick (inhalation of organism)(sudden fever, chills, pneumoniae, headache, but no rash).

5- Trench fever  
   Rochalimaea quintana  
   lice  
   (headache, leg pains, rash, high relapsing fever).

6- Sennetsu rickettsiosis  
   Unknown
Review Questions

• What is the major characteristics of mycoplasma?

• Chlamydia are obligate intracellular bacteria, have a two form of cells. What they are? Give one pathogen species as example?

• Why cannot stain mycoplasma by gram stain, why its resistant to penicillin, vancomycin and cephalosporin antibiotics?

• Mycoplasma needs to grow on media with a high contents of sterols, why? What is the characteristic of the colony?

• What are the two types of *Chlamydia trachomatis* diseases, how can treatment?

• Rickettsia can grow in yolksac of embryonated eggs, cell culture and laboratory animals, why?

• Parasites of the erythrocytes of human where they appear as short rods, what is the bacteria?

• Give four examples of Rickettsial groups?