Medical Bacteriology- Lecture 17

Unusual gram negative Bacteria

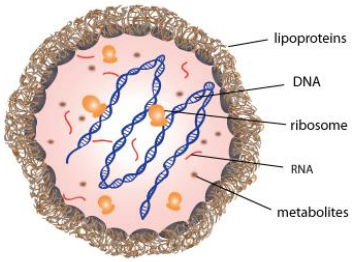
Mycoplasma, Chlamydia and Rickettsia

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**
- **Sterol containing cell membrane** (differ from other bacteria)
- **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
- fastidious
- Grow on media enriched with serum (need cholesterol)
- **Fried egg colonies on agar media**

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.)



Mycoplasma is a unique type of microorganism

Chlamydia

- **obligate intracellular bacteria**.
- Variable gram-negative cocci
- **do not have peptidoglycan (muramic acid).**
- ***Chlamydia*** infect a wide spectrum of hosts: birds, mammals, and humans.
- stain tissues with Giemsa or use a direct fluorescent antibody technique

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

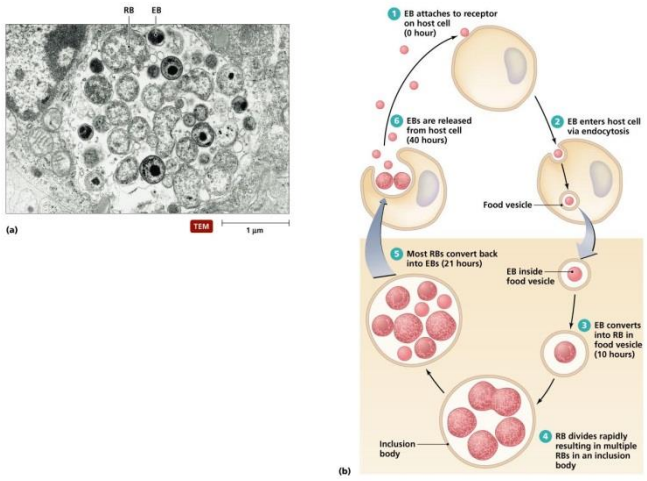
There are two morphological forms: elementary body and reticulate body or initial body (inside host cells).

• ***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)



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The chlamydias form dense initial (reticulate) bodies inside the host cell, then multiply. The new cells become elementary bodies that leave the cell after it dies and attack new cells.

Rickettsieae

Genera

- **(Obligate intracellular parasite); *Rickettsia*, *Rochalimaea, Coxiella, Orientia, Ehrlichia*.**

- **(not an obligate intracellular parasite); *Bartonella***

Rickettsia

- **Obligate intracellular**
- **Grow in cytoplasm of eukaryotic cells**
- pleomorphic, small gram-negative rod to coccoid
- stain poorly with gram stain but can be visualized with Giemsa method.
- **Reservoirs are animal and arthropod vector**
- **Zoonosis spread to human by arthropod**
- **Human are accidental hosts (infect human by bites)**

- **Cell wall; Peptodoglycan**
- **LPS (have weak endotoxic activity)**
- **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.**
- Inhibited by Tetracycline and Chloramphenicol

Ehrlichia

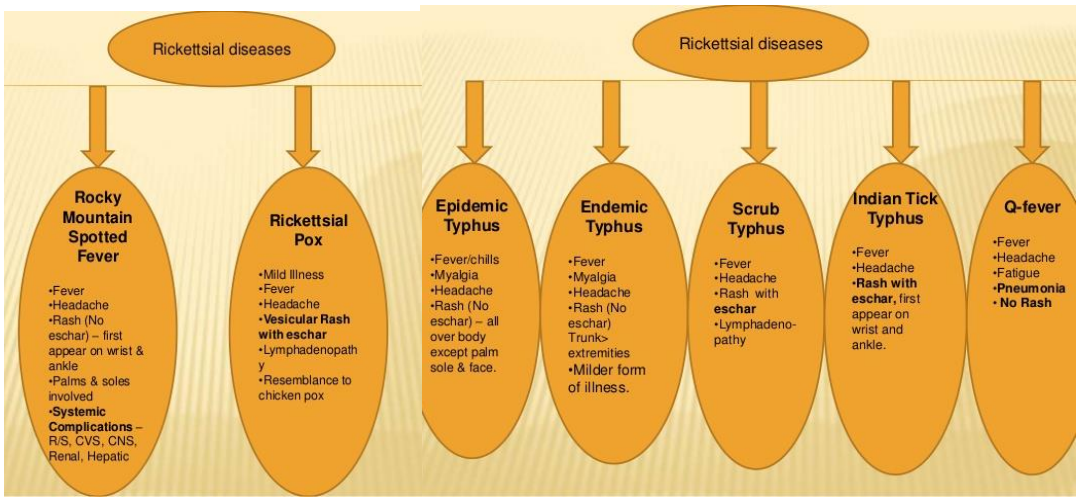
- Gram negative cocci
- cause (ehrlichiosis), a noncontagious disease known to be transmitted by a tick.
- Invade white blood cells; lumphocytes, neutrophils, monocytes

Bartonella (Bartonellosis)

- They range in shape from small coccoid and ring-shaped structures to long chains or clusters.
- Motile
- facultative intracellular parasite.
- **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**

Rickettsia have groups based on their antigenic structure. Groups are :

Group	Disease	Rickttesial Agent (Species)	Insect Vector	Intracellular Location	Reservoir
1- Typhus group	**Epidemic typhus**	***R. prowazekii***	**louce**	cytoplasm	Human
	Brill-Zinsser	*R. prowazekii*	none		
	Murine typhus (endemic)	*R. typhi*	Rat, flea		Rodent
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	Nucleus	Rodent, dog
	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		Mice
	fever, malaise, headache -usually not fatal				
	Boutonneuse fever (Indian Tick Typhus)	*R. conorii*	Tick		Rodent, dog
	Queensland tick typhus	*R. australis*	Tick		
	North Asian tick typhus	*R. sibirica*	Tick		
3- Scrub typhus		*Orientia tsutsugamushi*	Mite		Rodents
4- Q fever		***Coxiella burnetii***	Tick		Cattle, sheep, coat
inhalation of organism- sudden fever, chills, pneumoniae, headache, but no rash.					
5- Trench fever		*Rochalimaea quintana*	Lice		Human
headache, leg pains, rash, high relapsing fever					
6-Sennetsu rickettsiosis	Unknown				



Review Questions

What is the major characteristics of Mycoplasma, Chlamydia?

What is distinct feature of *M. pneumonia* colonies?

Why cannot stain Mycoplasma by gram stain, why its resistant to cell wall antibiotics?

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

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

What is major characteristics of Rickettsia?

Give four examples of Rickettsial groups?