

University of Basrah, Medical College – Microbiology Department

Microbiology/ 3rd Year M.B.CH.B. Students

Part II. Systematic Medical Bacteriology (22 hours)

Lecture (16)

Duration: 1 hour

Rickettsia diseases (Part I)

Assist. Prof. Dr. Nibras Saleam Al-Ammar



References: Microbiology (Lippincott's Illustrated Review) 3rd ed 2013

Mandell, Douglas and Bennett's Infectious Disease Essentials-2017



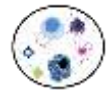
For more detailed instruction, any question, cases need help please post to the group of session.

Key definitions

Facultative intracellular pathogens: are capable of both intracellular & extracellular existence. Many facultative intracellular pathogens can be grown in the clinical microbiology laboratory on artificial culture media.

Obligate intracellular pathogens: must live within host cells to survive & multiply. In laboratory, they can be propagated in chicken egg embryo, laboratory animals, or cell cultures.

Rickets: is a skeletal disorder caused by lack of vitamin D, calcium or phosphate, characterized by weak & soft bones.



Learning objectives (LOs)

Intracellular pathogens	LO.1
Genera <i>Rickettsia</i>	LO.2
Clues to <i>Rickettsia</i> spp. Identification	LO.3
Physiology	LO.4
Pathogenesis	LO.5

Intracellular pathogens (LO.1)

Intracellular pathogens can be divided into two types:

1. Facultative intracellular pathogens

M. tuberculosis, *M. leprae*, *Listeria*, *Francisella*, *Legionella*, & *Brucella* spp.

2. Obligate intracellular pathogens

Chlamydia, *Rickettsia*, *Orientia*, & *Coxiella*

Genera *Rickettsia* (LO.2)

Genera *Rickettsia* includes:

R. Akari

R. Canadensis

R. Conorii

R. Prowazekii

R. Sibirica

R. typhi

R. rickettsii

Rickettsia spp.
Have no
connection to the
disease called
Ricketts (result
from vitamin D
deficiency).



(LO.2)

- The genus *Rickettsia* named for Howard T. Ricketts, a pathologist who discovered the etiologic agent & mode of transmission of spotted fever.
- *Rickettsia* invade endothelial cells & vascular smooth muscle cells.
- They live within the cytoplasm of host cells.

Clues to *Rickettsia* spp. (LO.3)

Cellular morphology:

- Small, rod-like or coccobacilli
- Have double-layered cell wall
- Polychrome stain (Giemsa) used for staining to visualize under light microscope

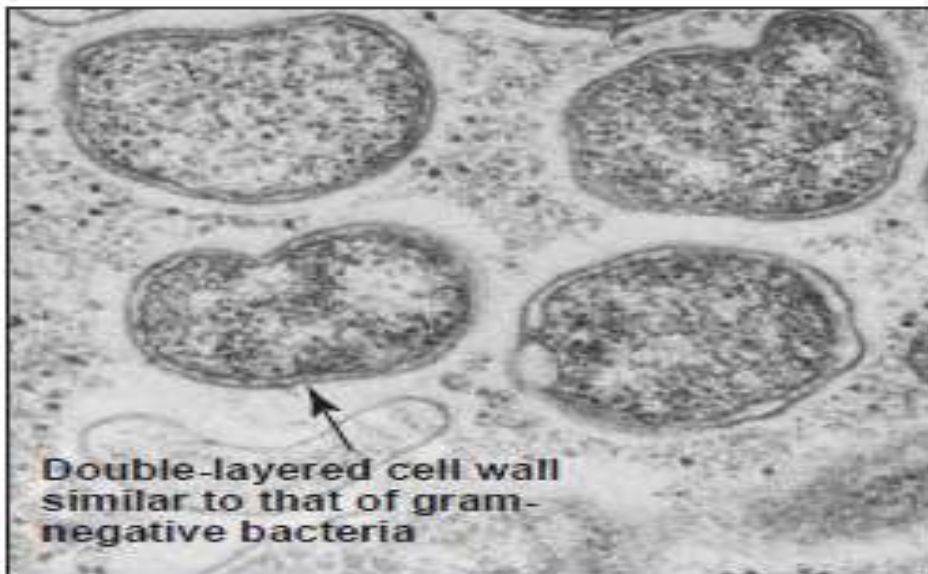


Figure 19.2

Electron micrograph of *Rickettsia prowazekii* in experimentally infected tick tissue.



Physiology (LO.4)

- *Rickettsia* can synthesize proteins, nucleic acids, & ATP but need an intracellular environment because they have unusual membrane transport system (leaky membranes).
- Its leaky membrane easily permeable to host cell nutrients and coenzymes.
- Electron transport chain and ATP-generating mechanism resemble those found in mitochondria.

Pathogenesis (LO.4)

- *Rickettsia* spp. Have an affinity for endothelial cells located throughout the circulating system.
- Following a bite by an infected arthropod, the organism are taken into cells by a phagocytosis- like process.
- The organism degrade phagosome membrane by phospholipase C.
- Thrombi formed in many organs including the skin.



Thank You