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Lecture. 12
Second Stage

College of Health & Medical Techniques
Department of Medical Laboratories Techniques

CHLAMYDIA

Chlamydia

Order: Chlamydiales Family Chlamydiaceae.

They are:

- **obligate intracellular bacteria** (like viruses)
- require biochemical resources of eukaryotic host cells to fuel their metabolism for growth and replication.
- *Chlamydia* spp. are similar to Gram-negative bacilli in that they have **lipopolysaccharide** (LPS) as a component of the cell wall. The chlamydial LPS, however, has little endotoxic activity.
- They have a major outer membrane protein (MOMP) that is very **diverse**.
- Chlamydiae have a unique developmental **life cycle**,
  - ✓ an **intracellular**, **replicative form**, the **reticulate body** (RB),
  - ✓ an **extracellular**, **metabolically inert**, **infective** form, the **elementary body** (EB).

The EB **cannot live** long periods of time outside of a host cell. The EB **transforms** into an RB after infecting a host cell. **Within vacuoles**, the RB divides via **binary fission**. The vacuole **enlarges** and becomes an **intracytoplasmic inclusion** as the number of RB rises. The RB then **transform back** into EB, which are then discharged from the host cell **48** to **72** hours after infection. There is evidence that, in addition to the replicative cycle associated with acute chlamydial infections, Chlamydia can persist in **vitro** in an abnormal form.

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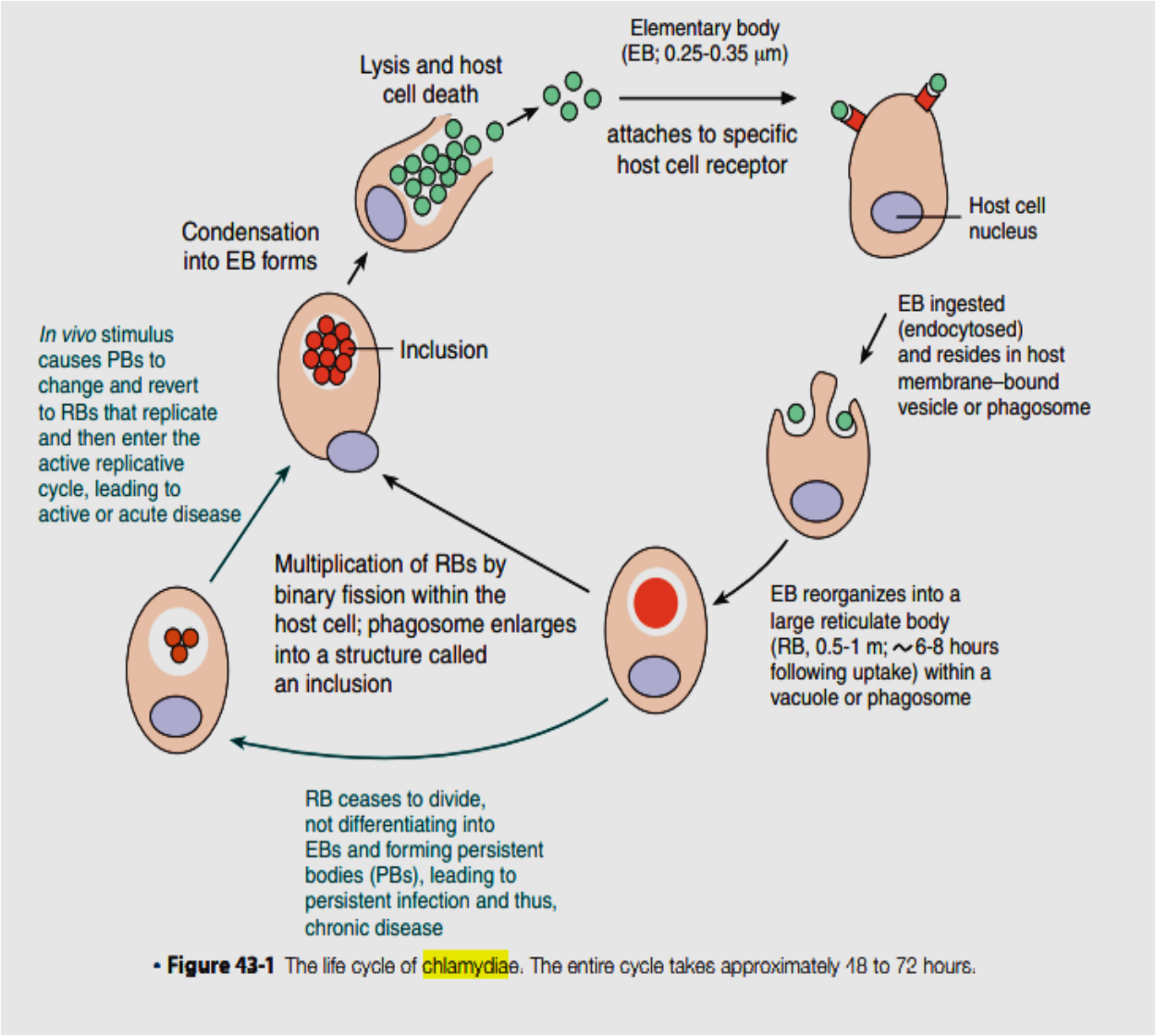

• **Figure 43-1** The life cycle of chlamydiae. The entire cycle takes approximately 18 to 72 hours.

CHLAMYDIA

Table-1: Differential Characteristics Among Chlamydiae That Cause Human Disease

Property	*Chlamydia trachomatis*	*Chlamydia psittaci*	*Chlamydia pneumoniae*
Host range	Humans (except one biovar that causes mouse pneumonitis)	Birds, lower mammals, humans (rare)	Humans
Elementary body morphology	Round	Round	Pear-shaped
Inclusion morphology	Round, vacuolar	Variable, dense	Round, dense
Glycogen-containing inclusions	Yes	No	No
Plasmid DNA	Yes	Yes	No
Susceptibility to sulfonamides	Yes	No	No

DNA, Deoxyribonucleic acid.

Chlamydia trachomatis

General Characteristics *C. trachomatis* infects humans almost exclusively and is responsible for various clinical syndromes. Based on major outer membrane protein (MOMP) antigenic differences, *C. trachomatis* is divided into **18** different **serovars** that are associated with different primary clinical syndromes.

Spectrum of Disease

- **Trachoma** is manifested by a **chronic inflammation** of the **conjunctiva** and remains a major cause of preventable blindness worldwide.
- **Lymphogranuloma venereum** (LGV) is a sexually transmitted disease.
- **Oculo-genital Infections** *C. trachomatis* can cause acute inclusion conjunctivitis in adults and newborns. The organism is acquired when contaminated genital

secretions get into the eyes via fingers or during passage of the neonate through the birth canal.

- **Perinatal Infections** Approximately one fourth to one half of infants born to females infected with *C. trachomatis* develop inclusion conjunctivitis. Usually, the incubation period is 5 to 12 days after birth, but it may be as long as 6 weeks

Laboratory Diagnosis

1. **Indirect method: Culture**: Several different **cell lines** have been used to isolate *C. trachomatis* in cell culture, including **McCoy, HeLa**, and **monkey kidney** cells; **cycloheximide**-treated McCoy cells are commonly used. After shaking the clinical specimens with 5-mm glass beads, centrifugation of the specimen onto the cell monolayer (usually growing on a coverslip in the bottom of a vial, commonly called a "shell vial") facilitates adherence of elementary bodies. After 48 to 72 hours of incubation, monolayers are stained with a fluorescein labeled monoclonal antibody.
2. **Direct Detection Methods**
    - **Cytologic Examination**. Cytologic examination of cell scrapings from the conjunctiva of newborns or persons with ocular trachoma can be used to detect *C. trachomatis* inclusions, usually after Giemsa staining.
    - **Antigen Detection and Nucleic Acid Hybridization**. To circumvent the shortcomings of cell culture, antigen detection methods are commercially available.