**LECTURE 5**

Chlamydia, Gardenerella, and Ureaplasma

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**Chlamydia trachomatis** is a Gram negative with LPS, obligate intracellular life cycle, associated with sexually transmitted disease (STD). It can cause:
- cervicitis in women
- urethritis
- proctitis in both men and women.

Chlamydial infections in women can lead to serious consequences including:
- Pelvic inflammatory disease (PID)
- Tubal factor infertility
- Ectopic pregnancy

**Chlamydia** is transmitted through sexual contact with the penis, vagina, mouth, or anus of an infected partner. **Chlamydia** can also be spread perinatally from an untreated mother to her baby during childbirth, resulting in Ophthalmia Neonatorum (conjunctivitis) or Pneumonia in some exposed infants. The possibility of sexual abuse should be considered in prepubertal children beyond the neonatal period with vaginal, urethral, or rectal chlamydial infection.

People who have had chlamydia and have been treated may get infected again if they have sexual contact with a person infected with chlamydia. Immunity provides little protection from reinfection.

In women, the bacteria initially infect the cervix, where the infection may cause signs and symptoms of **cervicitis** with mucopurulent discharge, easily induced endocervical bleeding, and sometimes affect the urethra, leading to **urethritis** (e.g.,
pyuria, dysuria, urinary frequency). Infection can spread from the cervix to the upper reproductive tract including uterus and fallopian tubes, causing pelvic inflammatory disease (PID).

Men who are symptomatic typically have urethritis, with a mucoid or watery urethral discharge and dysuria. A minority of infected men develop epididymitis presenting with unilateral testicular pain, tenderness, and swelling.

Chlamydia can infect the rectum in men and women, either directly (through receptive anal sex), or possibly via spread from the cervix and vagina in a woman with cervical chlamydial infection. While these infections are often asymptomatic, they can cause symptoms of proctitis.

Sexually acquired Chlamydial conjunctivitis can occur in both men and women through contact with infected genital secretions.

While Chlamydia can also be found in the throats of women and men having oral sex with an infected partner, it is typically asymptomatic and not thought to be an important cause of pharyngitis.

Chlamydia Developmental Cycle

♦ Elementary body;
  – Infectious form, metabolically inert
  – Extracellular spore-like state

♦ Reticulate body;
  – Non-infectious form, metabolically active
  – obligate intracellular form in eukaryotic cells
Chlamydiae grow in cytoplasmic inclusions in susceptible host cells, which include mucosal epithelium, vascular endothelium, smooth muscle cells, circulating monocytes and tissue-specific macrophages.

These intracellular pathogens can either induce host cell death, thereby possibly facilitating their spread to neighboring host cells and down-regulating inflammation, or they can inhibit apoptosis, allowing for sustained survival within the infected host cell.

**Lymphogranuloma venereum (LGV)** is a sexually transmitted disease that is frequent in Africa, Asia, and South America. The disease is characterized by a

- **The first stage**, which is characterized by a primary genital lesion at the initial infection site. This lesion is often small and may be unrecognized, especially by female patients.
- **The second stage**, acute lymphadenitis, often involves the inguinal lymph nodes, causing them to enlarge and become matted together, forming a large area of groin swelling, or bubo. During this stage, infection may become systemic and cause fever or may spread locally, causing granulomatous proctitis.
- **The third stage**, causing the development of genital hyperplasia, rectal fistulas, rectal stricture, draining sinuses, and other manifestations.

**Diagnosis of LGV is established by the isolation of an LGV strain from a bubo or other infected site.**

- Serology (MIF=microimmunofluorescence)
- Tissue Culture
- EIAs/DFA (direct fluorescent antibody)
- Direct hybridization
- Nucleic acid amplification (PCR)

**Mycoplasma and Ureaplasma**

The mycoplasmas are essentially bacteria lacking a rigid cell wall during their entire life cycle, although they are also much smaller than bacteria. Have very small genome, limited metabolic capabilities, and requires sterol for growth.

Because of the absence of cell walls, they do not stain with the Gram stain, and they are more pleomorphic and plastic than other bacteria. Using Giemsa stain, they appear as tiny pleomorphic cocci, short rods, short spirals, and sometimes as hollow ring forms. Their diameter ranges from 0.15 u to 0.30 u.
The cell is enclosed by a limiting membrane which is more similar to that of animal cells than that of bacterial cells because of sterols present in the membrane. In some strains, amorphous material on the outer surface of the membrane suggests the existence of a capsule. Major antigenic determinants are glycolipids and proteins, some cross reaction with human tissues.

**Mycoplasma hominis**
- **In women:** Associated with a variety of diseases including: infection of the uterine tubes (salpingitis), cervicitis, vaginitis, and tubo-ovarian abscesses, and PID
- *M. hominis* has been isolated from the blood of about 10% of women who have postpartum fever, and chorioamnionitis.
- **In Men:** Nonspecific urethritis, proctitis, balanoposthitis

**Ureaplasma urealyticum**
- Requires 10% urea for growth, probably causes nongonococcal urethritis in some men
- *U. urealyticum* is common in the female genital tract, and might be a cause of abortion, and infertility
- *U. urealyticum* has been associated with lung disease in premature low-birth-weight infants who acquired the organism during birth

**Laboratory diagnosis:**
**Culture:** Most mycoplasmas require complex media for growth, including sterols, serum proteins. fried egg appearance colonies on medium containing sterols
Serology:

Complement Fixation test
- on acute and convalescent serum.
- combine patient’s serum and known Mycoplasma antigen in presence of added complement. Mix.
- Incubate - add indicator system
- Red cells. Hemolysis occurs if complement is unused

Hemagglutination
- Cold agglutinins (antibodies) appeared to human O erythrocytes in the patient serum.

Bacterial vaginosis (BV) or Non specific vaginitis
- BV occurs when the balance of the bacterial flora is disrupted, allowing overgrowth of specific organisms.
- The healthy vagina maintains a pH between 3.8 and 4.5 and has a normal microbiota consisting mainly of Lactobacillus spp.
- Hormonal changes such as menstrual periods and Pregnancy reduce vaginal acidity
- When vaginal pH increases, various species of M.O. colonized the vagina, including:
  - Prevotella
  - Porphyromonas
  - Peptostreptococcus
  - Mobiluncus
  - Gardnerella vaginalis
  - Mycoplasma hominis
  - Ureaplasma spp. will overwhelm the lactobacilli.
- This mix of organisms leads to the vaginal discharge and distinct odor.
- Discharge is often more apparent and odorous after intercourse, after exposure to male ejaculate.
- Patients with BV demonstrate a discharge that is usually a milky homogeneous thin liquid adhering to the walls of the vagina.

Laboratory Diagnosis
- The presence of “clue cells,” which are vaginal squamous epithelial cells coated with G. vaginalis and the lack of visible lactobacilli.
- **Homogenous gray discharge** (Cottage cheese discharge)
  
- An increased **pH greater than 4.5**.
- A positive **“whiff” test or “Sniff” test**.
- The whiff test demonstrates a typical fishy odor on addition of one or two drops of 10% KOH to vaginal discharge because of the presence of volatile amines. The demonstration of at least three of these conditions is diagnostic for bacterial vaginosis.
- *G. vaginalis* proline aminopeptidase (EIA).