

# Spirochetes

## General features

- Tiny Gram –ve bacteria (5-20  $\mu\text{m}$ ).
- Long helically coiled cells.
- Commonly found in humans, animals and arthropods.

Spirochetes are divided into 3 genera: 1) *Treponema*, 2) *Borrelia*, 3) *Leptospira*.

*Treponema* has 2 types: - Non-pathogenic (which is found in the oral cavity).

- Pathogenic (Mainly *Treponema Pallidum*).

## *Treponema Pallidum* (Syphilis)

- Venereal Disease or Sexually Transmitted Disease (STD).
- Enter the body by penetrating the intact mucous membrane or by invading through columnar or epithelial breaches (abrasions).
- It begins as an acute infection and may progress into a chronic infection if untreated.
- After an incubation period of (2 weeks to a few months) syphilis starts to progress through 3 clinical stages:
  - 1) **Primary syphilis**: Painless lesions (called **Chancre lesions**) in the genitalia, anal area or mouth.
  - 2) **Secondary syphilis**: If untreated, *Treponema Pallidum* spread to the blood (bacteremia) and lymph system through tissue and mucous membrane causing a systematic disease. Any organ can be infected (including CNS, eyes, kidneys and bones), and lesions are symmetrically distributed.
  - 3) **Tertiary syphilis**: generally develops over 6-40 years with slow inflammatory damage to organ tissue (Granulomatous lesions in skin or bone), small blood vessels, nerve cells and meninges (meningitis), hepatitis and nephritis.
- **Congenital syphilis** occurs in the fetus of an infected pregnant woman, however, clinical manifestations appear early within 2 years after birth affecting mainly the CNS, bones (osteitis) and teeth in addition to lesions.

## Diagnosis:

- *Treponema* is difficult to culture on a normal media.
- 1<sup>st</sup> and 2<sup>nd</sup> active stages can be diagnosed by **direct dark-field microscopy** (like the first picture of spirochetes in 3a9em's slide).

- **Serologic tests** can be done during inactive stages including **VDRL** (nonspecific) and the **Fluorescent Treponemal Antibody-test (FTA)** (specific).
- Treatment by **Penicillin**.

### *Borrelia Burgdorferi (Lyme Disease)*

- A common disease in the US
- Transmitted by **insect vectors** (Tick)
- Wild animals, rodents and birds serve as reservoirs for this bacterium.
- Incubation period : few weeks – months
- Early stage shows a single lesion but it then spread into multiple lesions and the bacterium disseminate infecting other organs mainly the CNS, heart (Cardiac abnormalities) and the bone (arthritis).

### *Leptospira*

- Zoonotic (contaminated water).
- Can cause a mild to severe fatal systemic disease
- Also responsible for **Weil's Disease** characterized by infectious jaundice, high fever, vasculitis, renal failure, hepatitis and hemorrhage in many organs.

### *Diagnosis for Lyme disease and Leptospiral diseases:*

- **Serological tests** and **culture on special media**.