- Normally, there is a balance between host defenses and microbial virulence.
- **Pneumocystis jiroveci:**
  - **Cystis**: because it is forming cysts during its life cycle.
  - **Pneumo**: because it is causing chest infection (type of pneumonia). Clinically, this is represented by diffuse bilateral interstitial infiltrates.
  - **Sample which must be taken to detect the organism:**
    - ✓ Induced sputum.
    - ✓ Bronchoalveolar lavage (most common).
      Then, the sample will be stained by Giemsa or silver stain in cytology lab (why?) → so cysts can be detected. A more common way to identify the organism from the sample is by direct antigen detection using immunofluorescence (remember that this method is also used to detect RSV or influenza virus).
- **Herpes zoster:**
  - **Skin lesion**: it is linear around the root of the nerve (along the dermatome). The lesion is characterized by vesicles (vesicles are found in lesions caused by all types of Herpes).
  - **Herpes family includes the following viruses:**
    - ✓ Herpes simplex virus: which is further sub-classified to two types (type-I and type-II).
    - ✓ Varicella zoster virus (which causes chicken-pox and shingles).
    - ✓ Epstein-Barr virus (causing infectious mononucleosis).
    - ✓ Cytomegalovirus (CMV).
      Note: all of these types of viruses are known as (latent viruses) → which means that they have the ability to be reactivated especially when the immune system is compromised.
  - **How to detect this virus**: generally viruses can be cultured on cell-line (viable cells). If the virus is present, cytopathic effects will be detected such as:
    - ✓ Ballooning (seen with herpes simplex virus).
    - ✓ Inclusions.
    - ✓ Lysis.
    - ✓ Syncitium formation.
- **Epstein-Barr virus (EBV):**
  - **It is known to cause infectious mononucleosis.**
  - **Stages of disease caused by the virus:**
    - ✓ Acute/ primary: the first exposure of the body to the virus. This type of infection results in the typical infectious mononucleosis.
    - ✓ Past EBV.
    - ✓ Reactivation of EBV in an immunocompromised patient.
  - **How to detect this virus:**
    - ✓ Anti-VCA: caspid antigen (which contains both IgM and IgG).
    - ✓ Anti-EBNA
    - ✓ Anti-EA
      Note: Anti-EBNA is formed only two months after the exposure so it helps you to differentiate between acute primary EBV where anti-EBNA will not be present and reactivation of EBV where all of the markers above will be present together.
  - **Associated diseases with EBV:**
    - ✓ Burkitt's lymphoma.
    - ✓ Nasopharyngeal carcinoma.
    - ✓ Post-transplant lymphoproliferative disease (PTLD).
- **Cytomegalovirus CMV):**
  - **It is the most serious type of infection which might occur in a transplant patient. This organism is treated with ganciclovir.**
  - **Infection with CMV can be:**

- ✓ Asymptomatic: where there is no clinical syndrome. Notice that most of the people acquire this organism during the first five years of their lives and presenting only with influenza-like manifestations.
- ✓ CMV disease which is characterized by the following symptoms:
  - ❖ *Brain*: encephalitis.
  - ❖ *Eye*: retinitis.
  - ❖ *Lung*: pneumonia.
  - ❖ *Stomach and intestines*: gastroenteritis.

- **Detecting the virus:**
  - ✓ A biopsy from the transplanted organ will show inclusion bodies (known as owl's eye).
  - ✓ Laboratory investigations:
    - ❖ *Culture*: usually it is not done because it consumes a lot of time.
    - ❖ *Detection of pp65 antigen* –in a blood sample with anticoagulant- by direct immunofluorescence (this antigen shows if there is reactivation of a past virus). This antigen is detected in PMNs (lobulated nuclei). pp stands for: pyrophosphate matrix protein.

- **BK virus:**
  - **Belonging to human papilloma virus (HPV).**
  - In patients with kidney transplant, this virus can cause deterioration in kidney's function **(nephropathy and graft loss).**
  - **Transmission of the virus is by**: respiratory secretions.
  - **Laboratory tests:**
    - ✓ The best way to detect the virus is by taking biopsies.
    - ✓ A second way is by doing urine cytology aiming to detect decoy cells.
  - **Treatment**: there is no specific drug against the virus but the viral load can be reduced by manipulating immunosuppressive drugs taken by the patient.

==========

- **Atypical mycobacteria:**
  - **It causes four clinical syndromes:**
    - ✓ Pulmonary disease.
    - ✓ Lymphadenopathy.
    - ✓ Skin disease.
    - ✓ Disseminated disease.
  - **Culture**: LJ agar.
  - **Stain**: Ziehl-Neelsen

==========

- **Cryptosporidium:**
  - **It is a parasite.**
  - **Clinically causing**: watery diarrhea in immunocompromised patients.
  - **Stain**: acid-fast

==========

- **Aspergillus:**
  - **There are three types of aspergillus:**
    - ✓ A.flavus (greenish-yellow in color): producing aphla toxin an harming the liver.
    - ✓ A.fumigatus (olive-green in color): causing aspergilloma.
    - ✓ A.niger: causing otitis externa.
  - **Culture**: sabouraud agar.
- **Candidia albicans**: it is a mold.
- **Cryptococcus neoformans:**
  - **Yeast.**
  - **Transmission**: from pigeon's feces → entry through the lungs.
  - **Stain**: india-ink.