Sexually Transmitted Diseases

(STDs)

STDs covered:

- Syphilis
- Gonorrhoea
- HIV

Syphilis

- *Treponema pallidum* subspecies pallidum (Bacteria)
- NO vaccine.
- Transmission:
  - Sexual activity
  - Mother -> baby during pregnancy/birth: Congenital syphilis
- Four stages of syphilis:
  - Primary
  - Secondary
  - Latent
  - Tertiary

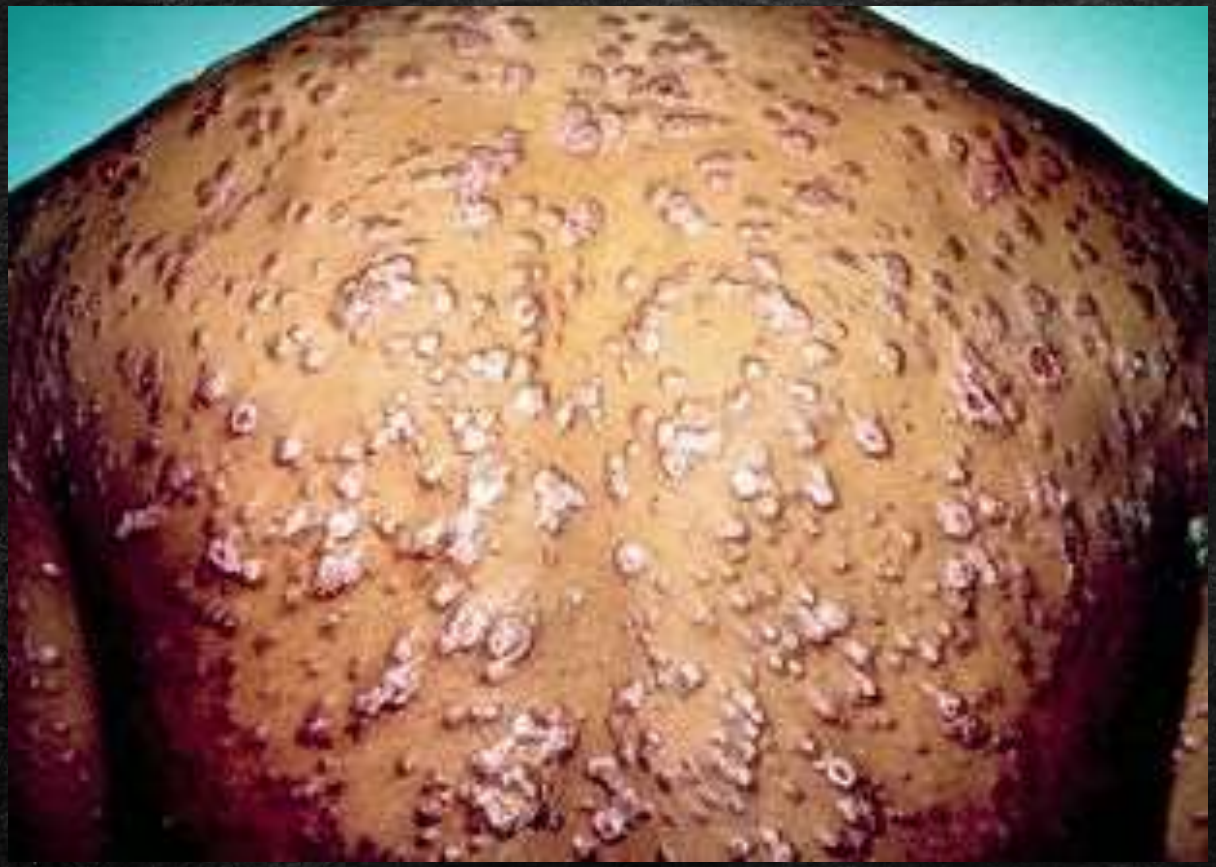
Syphilis - Primary

- Direct sexual contact with infectious lesions.
- 2-6 weeks a chancre appears containing infectious spirochetes.
- Single, firm, painless, non-itchy skin ulceration.
- Multiple lesions may be present; common with HIV co-infection.
- Most common locations:
  - Women: Cervix
  - Men: Penis, anus

Syphilis - Secondary

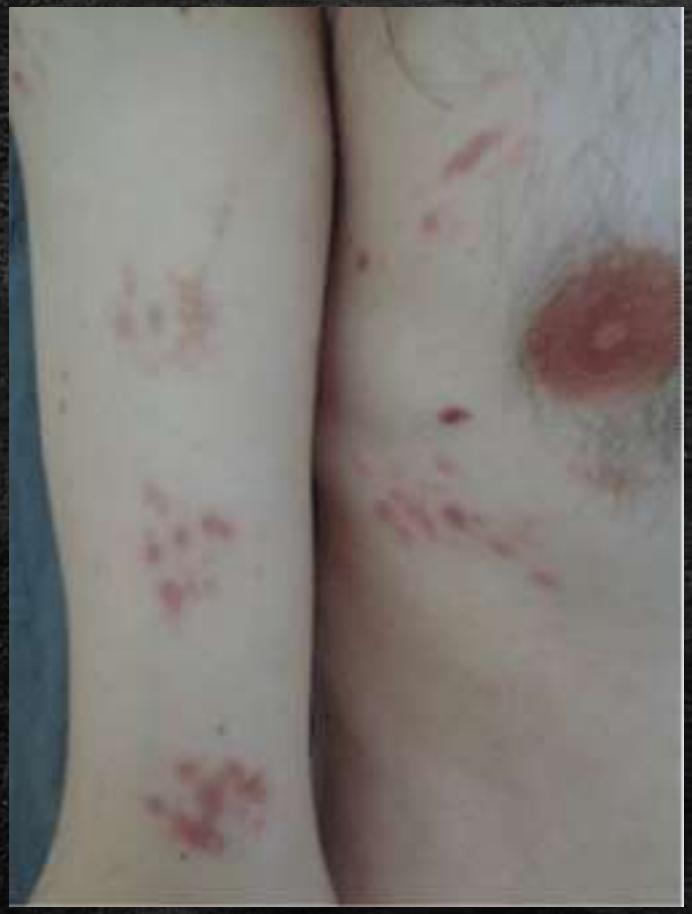
- 4-10 weeks after primary infection.
- Non-itchy rashes, palms/soles in 50% of cases.
- Rashes may become maculopapular/pustular, form whitish wart-like lesions on mucous membranes.
- Others: Fever, sore throat, malaise, weight loss, hair loss, headache.
- Acute symptoms usually resolve after 3-6 weeks.

Syphilis - Secondary



Reddish papules & nodules due to secondary syphilis

Syphilis - Secondary



Corymbiform syphilis:

Rash presenting as a cluster of erythematous papules around a central scaly plaque, resembling a flower.

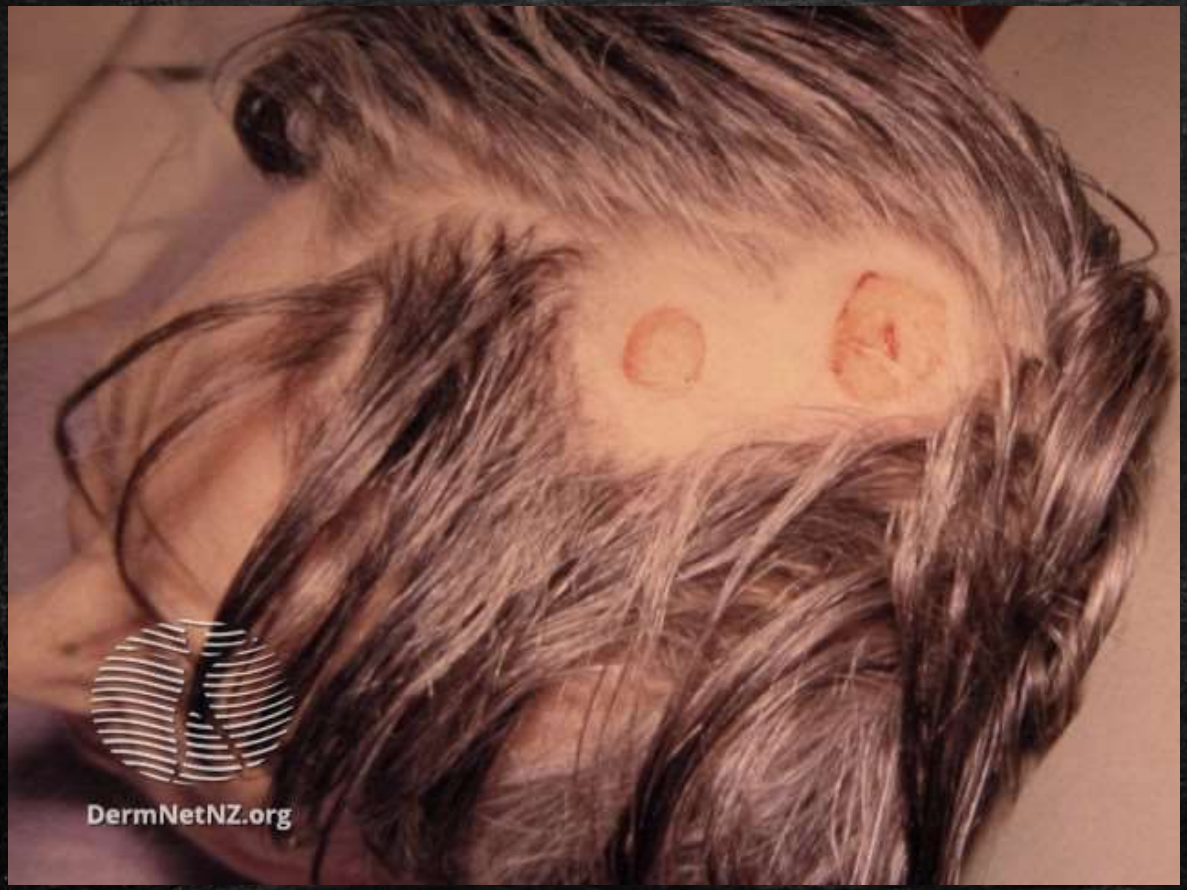
Syphilis - Latent

- **Serologic proof of infection without symptoms.**
- Develops after secondary syphilis, before tertiary syphilis.
- Only detected by **positive treponemal antibody tests**.
- Early latent syphilis:
  - Highly infectious
  - First two years
- Late latent syphilis
  - After two years
  - Non-infectious to sexual partners
  - Can pass from pregnant woman to foetus.

Syphilis - Tertiary

- 3-15 years after initial infection.
- Not infectious.
- Three forms:
  - Gummatous: Soft tumour-like lesion with central necrosis.
  - Cardiovascular: Rare; causes aortic aneurysm formation.
  - Neurosyphilis: Presents as
    - Meningovascular (ischaemic stroke)
    - Paresis (e.g dementia)
    - Tabes dorsalis (wasting away of spinal cord)

Syphilis - Tertiary



Gummatous lesion

Syphilis - Congenital

- Transmitted during pregnancy/birth.
- May be asymptomatic.
- Common symptoms:
  - Liver & spleen enlargement
  - Rash
  - Fever
  - Neurosyphilis
  - Lung inflammation
- Also associated with miscarriage.

Syphilis - Diagnosis

- Difficult to diagnose during early infection
- Confirmation: Blood test / dark field microscopy
- Unable to distinguish between stages of disease.
- Blood tests are divided into
  - Nontreponemal:
    - Venereal disease research laboratory (VDRL)
    - Rapid plasma reagin (RPR)
  - Treponemal:
    - Treponemal pallidum particle agglutination (TPHA)
    - Fluorescent treponemal antibody absorption test (FTA-Abs)

Syphilis – Diagnosis - RPR

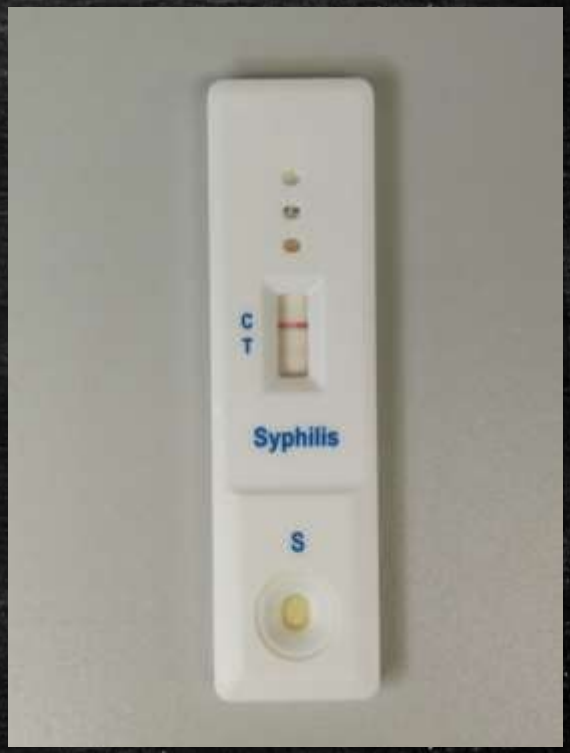
- RPR Card antigen suspension is a carbon particle cardiolipin antigen which detects reagin*.
- ***Reagin***: Antibody-like substance present in serum/plasma from syphilitic persons, occasionally in people with other acute/chronic conditions.
- Reagin binds to the test antigen consisting of cardiolipin-lecithin-coated cholesterol particles, causing macroscopic flocculation.
- False positives can occur with infectious mononucleosis, leprosy, malaria, lupus erythematosus, and pregnancy.
- A titre of >16 indicates active disease.
- A titre of <16 doesn't exclude active infection but is consistent with late latent infection/treated infection.

Syphilis – Diagnosis – Rapid

- Syphilis Ultra Rapid is a rapid chromatographic immunoassay for the qualitative detection of IgG & IgM antibodies to Treponema Pallidum to confirm syphilis diagnosis.
- Specimen reacts with syphilis antigen coated particles, migrating chromatographically and interacts with the immobilized recombinant syphilis antigen in the test line region.
- If the specimen contains antibodies a coloured line will appear in the test line region.
- To serve as a control, a coloured line will always appear in the control line region. If it does not appear, the test is not valid.

Syphilis - Diagnosis

RPR test



Rapid test

Gonorrhoea

- Caused by *Neisseria gonorrhoeae* (bacteria)
- Burning during urination, genital discharge, pain.
- Many of those infection have no symptoms, but if untreated can spread to joints & heart valves.
- Spread through sexual contact, including oral, anal, vaginal sex.
- Can also spread from mother to child during birth and cause permanent blindness in a newborn baby.
- Previous infection does NOT confer immunity.

Gonorrhoea

- Exposure -> Symptoms: 2-14 days
- Most symptoms appear between 4-6 days after infection, if at all.
- Those with throat infections may experience a sore throat.

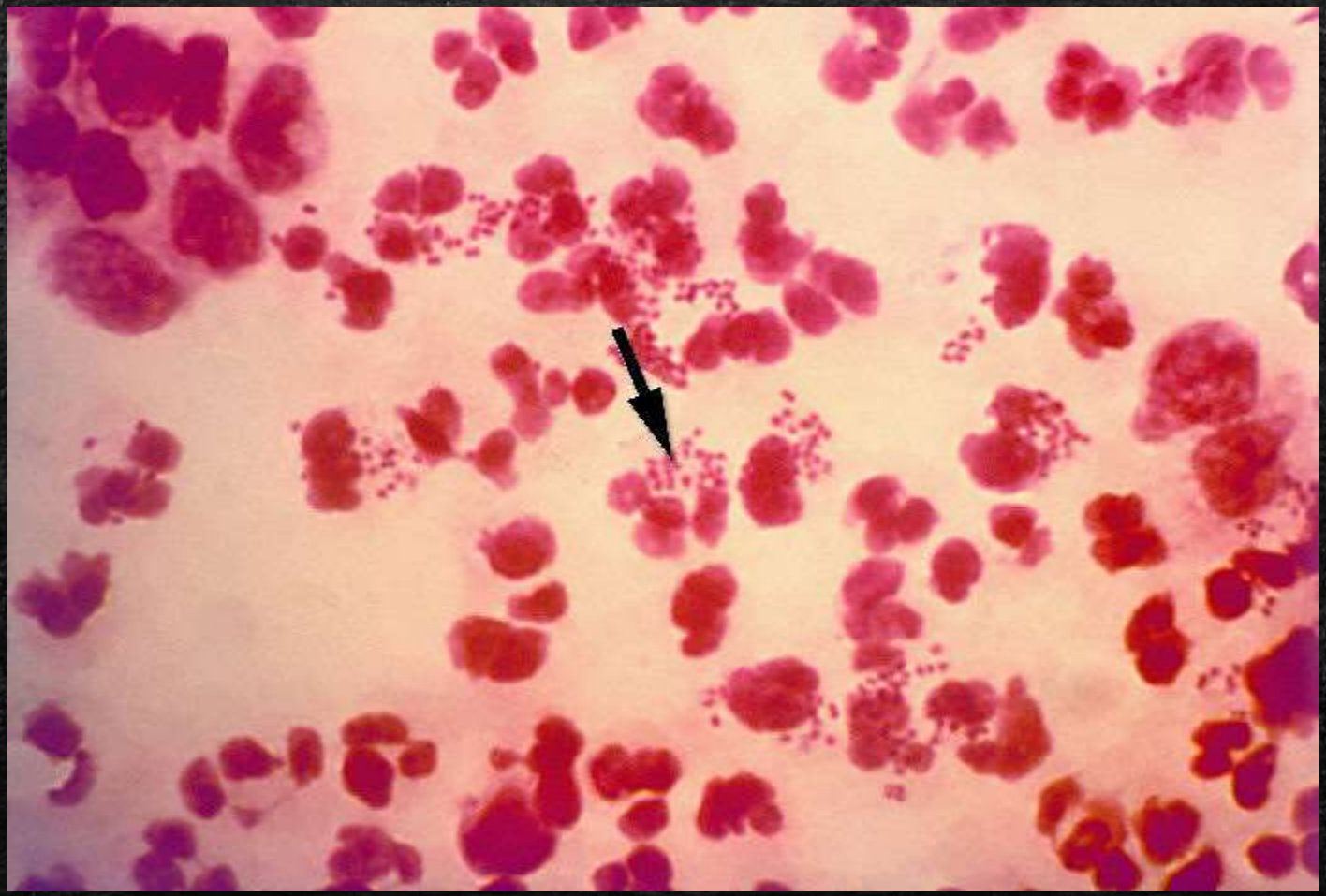
Gonorrhoea – Gram stain & culture

- If Gram negative, oxidase positive diplococci are visualized on direct Gram strain of urethral pus, no further testing is needed.
- In females, direct Gram stain of cervical swabs are not useful as
  1. *N. gonorrhoeae* is less concentrated in these samples
  2. False positives as Gram-negative diplococci native to the normal vaginal flora cannot be distinguished from N. gonorrhoeae.

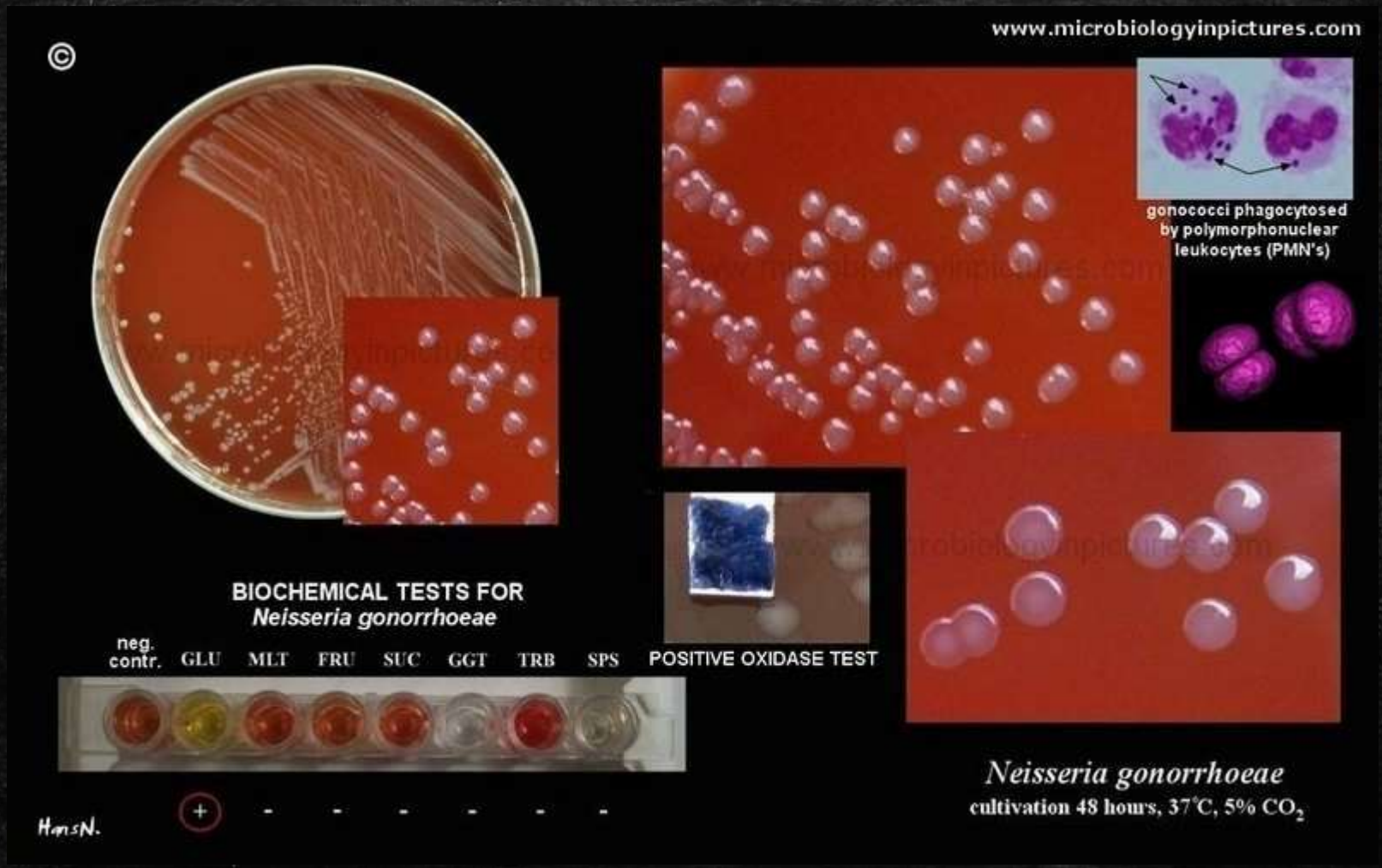
Gonorrhoea – Gram stain & culture

- **Gram-negative intracellular diplococci**
- Culture agar plates used:
  - Thayer-Martin (MTM)
  - Saburoud Dextrose (SDA)
  - MacConkey II
  - Chocolate
  - Blood
- Biochemical identification
  - Catalase: Positive
  - Oxidase: Positive
  - H_2S: Negative
- Resistant to colistin

Gonorrhoea – Gram stain & culture



Gonorrhoea – Gram stain & culture



HIV
(Human Immunodeficiency Virus)

- A retrovirus that causes acquired immunodeficiency syndrome (AIDS) over time.
- Transmission through contact/transfer of blood, pre-ejaculate, semen, and vaginal fluids.
- Non-sexual transmission from infected mother -> infant during pregnancy, childbirth by exposure, and breast milk.
- Sharing contaminated needles when injecting drugs.
- Untransmittable through condomless intercourse IF partner has a consistently undetectable viral load (<50 copies/ml).

HIV

- Infects helper T cells ($CD4^+$ T cells), macrophages, and dendritic cells.
- Infection leads to low $CD4^+$ T cell levels, including killing infected $CD4^+$ T cells by CD8+ cytotoxic lymphocytes.
- When $CD4^+$ T cell numbers drop below a critical level, cell-mediated immunity is lost, and the body becomes more susceptible to opportunistic infections, leading to AIDS.

HIV - Diagnosis

- HIV-1 testing is initially done using eynzyme-linked immunosorbent assay (ELISA) to detect antibodies.
- Only specimens repeatedly reactive by ELISA *AND* positive by immunofluorescence assay/PCR or reactive by western blot are considered HIV-positive.
- Specimens repeatedly ELISA-reactive may provide an indeterminate western blot result: Either an incomplete antibody response to HIV in an infected person or nonspecific reactions in an uninfected person.

HIV – Alere Determine HIV 1/2

If antibodies to HIV-1 and/or HIV-2 are present in the sample, the antibodies bind to the antigen-selenium colloid and to the antigen at the patient window, forming a red line at the patient window site.

HIV – Window period

- Most people develop antibodies within 28 days of infection. During this time people experience a window period – when HIV antibodies aren't high enough to be detected by standard tests, but also when they may transmit HIV to others.
- For children <18 months, serological testing is insufficient to detect HIV infection. Virological testing must be done at birth or 6 weeks of age.
- HIV p24 antigen can be detected as early as 2-3 weeks after infection.
- Anti-HIV antibodies are detectable in serum from around 4 weeks post-infection.

HIV – Post-exposure prophylaxis (PEP)

- Given after possible recent exposure to HIV.
- PEP must start within **72 hours** of possible exposure to HIV.
- From there it must be taken daily for 28 days.
- Side effects: Fatigue, diarrhoea, nausea, flatulence, abdominal cramps, bloating, headache, vivid dreams, depression, thirst.

References

- https://dermnetnz.org/topics/syphilis
- https://en.wikipedia.org/wiki/Syphilis
- https://www.researchgate.net/figure/Corymbiform-secondary-syphilis-with-lesions-disseminated-throughout-the-body-formed-by-a_fig3_324120298
- https://www.grepmed.com/images/4301/secondary-staging-stages-syphilis-diagnosis
- https://en.wikipedia.org/wiki/Gonorrhea
- https://www.cdc.gov/std/gonorrhea/lab/ngon.htm
- https://microbeonline.com/thayer-martin-agar-composition-preparation-uses-colony-characteristics/

References (cont.)

- https://www.aidsmap.com/about-hiv/what-window-period-hiv-testing
- https://en.wikipedia.org/wiki/HIV
- https://www.who.int/news-room/fact-sheets/detail/hiv-aids
- https://www.cdc.gov/hiv/basics/pep.html
- Elecsys HIV Combi PT Product Insert
- ABON Syphilis Ultra Rapid Test Device Product Insert
- BD Macro-Vue RPR Card Tests Product Insert