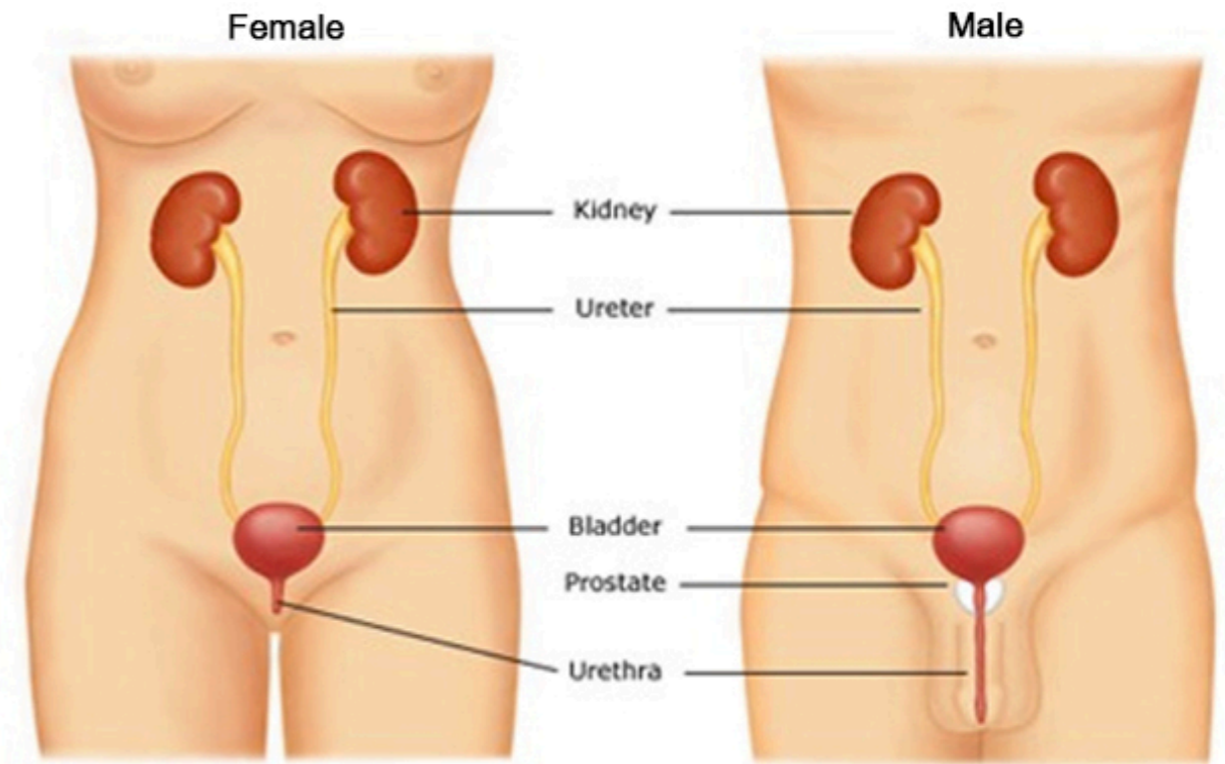


AGENTS OF UTI & STD

Layla Abdulla

URINARY TRACT INFECTIONS

- Predisposing factors:
 - Gender
 - Renal calculi, obstructions
 - Vesicoureteral reflux
 - Catheterization
 - Enlarged prostate
- Cystitis:
 - Dysuria, frequency, urgency
 - Suprapubic pain
 - WBCs in urine
- Pyelonephritis:
 - Fever, chills, flank pain
 - Costovertebral angle tenderness
 - Hematuria, WBC casts in urine

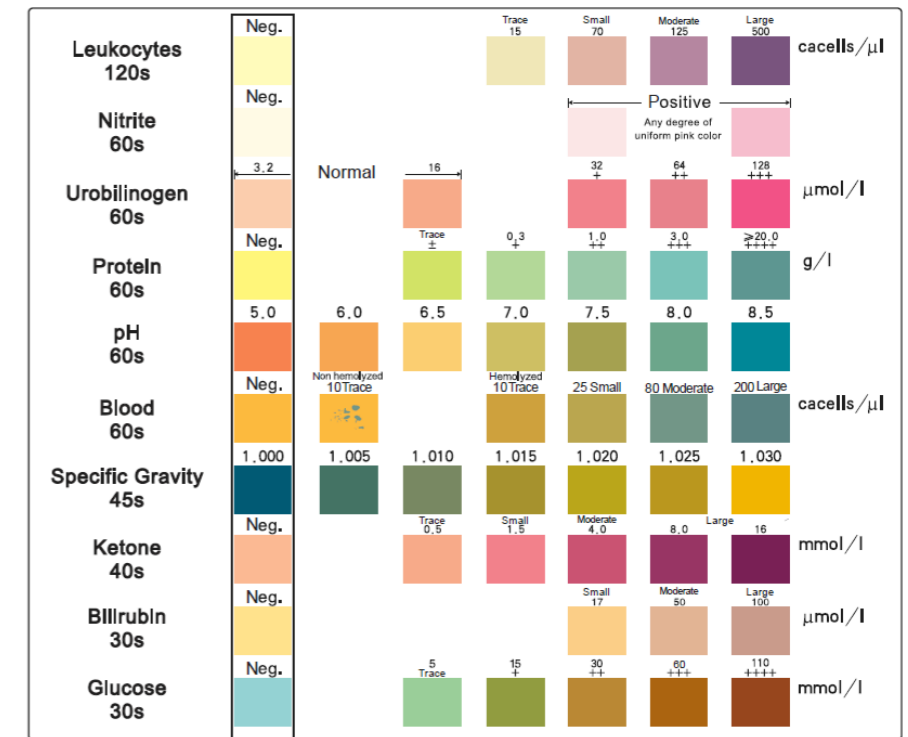


COMMUNITY	NOSOCOMIAL
E. coli	Klebsiella
Proteus mirabilis	Serratia
S. Saprophyticus	Pseudomonas
	Enterococci

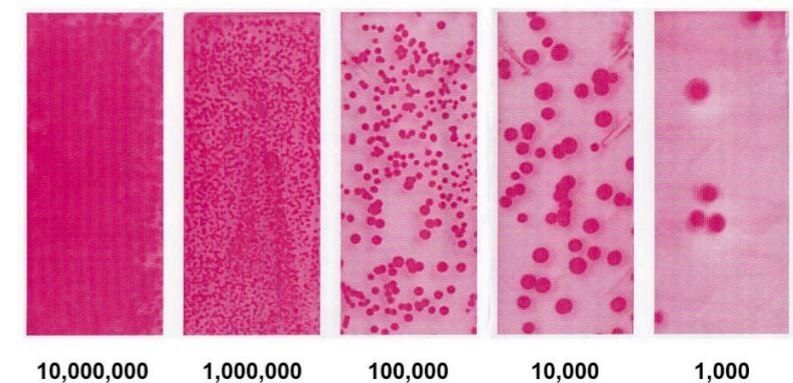
URINARY TRACT INFECTIONS

DIAGNOSIS

- Midstream urine, suprapubic aspiration, single catheter urine
- Specimen must be processed within 2 hours from collection - if not, store 2-8°C
- $> 10^5$ CFU/ml significant bacteriuria depending on sampling technique
- Urine dipstick: nitrite, leukocyte esterase
- Urine dip slide: CLED, MacConkey agar
- Microscopy, culture, MALDI TOF identification



Bacteria Count (CFU/mL)



UTI + STD

SAMPLES



Urine: midstream	Sterile urine container	Bacteria: 1 ml Mycobacteria: ≥ 10 ml	Contamination of the specimen with bacteria from the urethra or vagina should be avoided; the first portion of the voided specimen is discarded; organisms can grow rapidly in urine, so specimens must be transported immediately to the laboratory, held in bacteriostatic preservative, or refrigerated.
Urine: catheterized	Sterile urine container	Bacteria: 1 ml Mycobacteria: ≥ 10 ml	Catheterization is not recommended for routine cultures (risk of inducing infection); the first portion of collected specimen is contaminated with urethral bacteria, so it should be discarded (similar to midstream voided specimen); the specimen must be transported rapidly to the laboratory.
Urine: suprapubic aspirate	Sterile anaerobic tube or vial	Bacteria: 1 ml Mycobacteria: ≥ 10 ml	This is an invasive specimen, so urethral bacteria are avoided; it is the only valid method available for collecting specimens for anaerobic culture; it is also useful for collection of specimens from children or adults unable to void uncontaminated specimens.
Genitals	Specially designed swabs for <i>Neisseria gonorrhoeae</i> and <i>Chlamydia</i> probes	N/A	The area of inflammation or exudate should be sampled; the endocervix (not vagina) and urethra should be cultured for optimal detection. The first voided urine specimen can be used for diagnosis of urethritis.

URINARY TRACT INFECTIONS

COMMUNITY ACQUIRED

- E. coli:
 - Motile Gram (-) rods
 - Nitrate reducing
 - Pink lactose fermentation on MacConkey agar
- Proteus mirabilis:
 - Highly motile Gram (-) rods
 - Fishy odor
 - Urease producing
 - Alkaline urine sample
 - Renal stones (struvite, apatite)
 - Lactose negative, swarming motility
- S. saprophyticus:
 - Gram (+) cocci
 - Coagulase negative
 - Urease producing
 - Novobiocin resistant

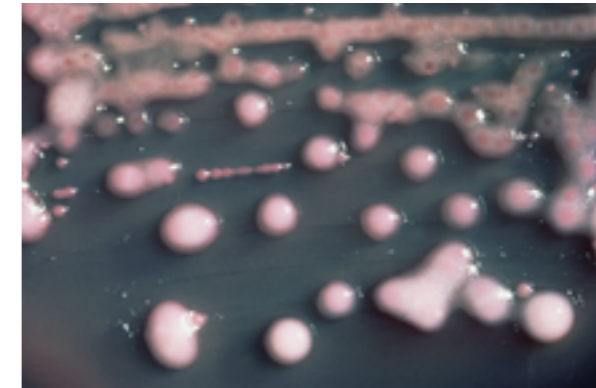


URINARY TRACT INFECTIONS

NOSOCOMIAL

- Klebsiella:

- Non-motile Gram (-) rods
- Urease producing
- Large mucoid capsule, viscous colonies
- Pink lactose fermentation on MacConkey agar



- Serratia:

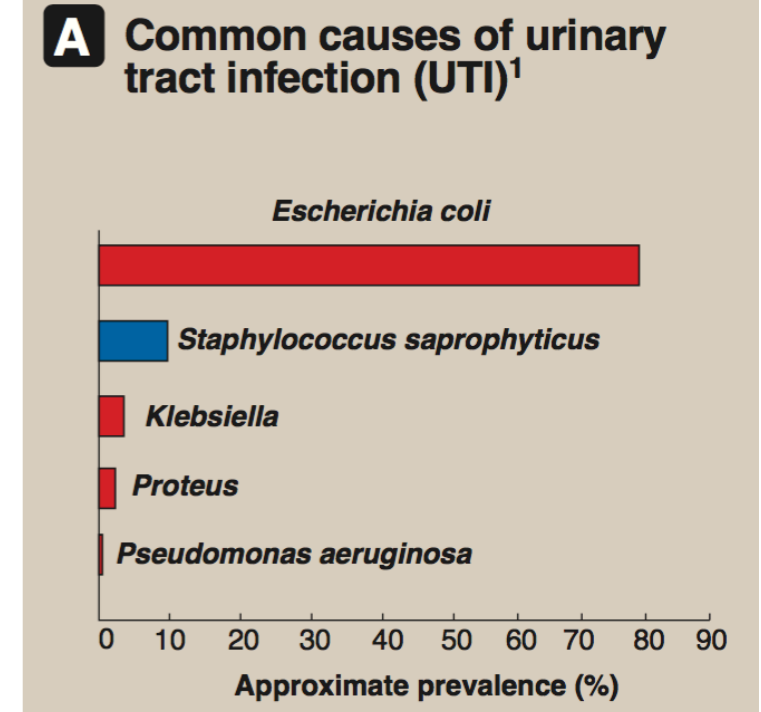
- Motile Gram (-) rods
- Some strains produce red pigment
- Slow pink lactose fermentation on MacConkey agar

- Pseudomonas:

- Motile encapsulated Gram (-) rods
- Catalase, oxidase positive, β hemolytic
- Blue-green pigment (pyocyanin), grape-like odor

- Enterococci:

- High intrinsic antibiotic resistance (VRE) → Susceptibility testing
- γ hemolysis on sheep's blood agar
- Treatment: Nitrofurantoin, tigecycline



URINARY TRACT INFECTIONS

- **Viruses:**

- Polyomaviruses JC & BK:

- Nephropathy, hemorrhagic cystitis in kidney transplant patients
 - Diagnosis: Urine cytologic tests, PCR

- Adenovirus:

- Acute hemorrhagic cystitis with dysuria, hematuria
 - Diagnosis: Immunoassays, PCR

- **Fungi:**

- Candida spp:

- Asymptomatic bladder colonization, cystitis, urethritis, renal abscesses, papillary necrosis
 - Diagnosis: Microscopy, Culture - selective chromogenic medium. KOH prep.

URINARY TRACT INFECTIONS

- Other Bacteria:

- Leptospira:

- Weil's disease: jaundice, kidney failure, hemorrhage.
 - Diagnosis: Serology - microscopic agglutination test (MAT)

- M. tuberculosis:

- Urogenital tuberculosis: persistent cystitis, dysuria, strictures of ureter
 - Diagnosis: Culture, PCR

- Parasites:

- Schistosoma hematobium:

- Bladder inflammation, hematuria, hydronephrosis
 - Diagnosis: Eggs in urine sample. Bladder biopsy. Serology.

SEXUALLY TRANSMITTED DISEASES

- WHO:

- More than 1 million new STDs acquired globally every day

- STDs like syphilis and HSV2 can increase the risk of HIV acquisition

- HPV infection causes 528,000 cases of cervical cancer and 266,000 cervical cancer deaths each year

- Marginalized people with the highest rates of STDs most often don't have access to adequate health services



- CDC:

- People between 15-24 years old acquire half of all new STDs

- 1 in 4 sexually active adolescent females has an STD

- Undiagnosed STDs cause 24,000 women (USA) to become infertile each year

- 4 curable: Trichomoniasis, gonorrhea, chlamydia, syphilis

- 4 incurable: HBV, HSV, HPV, HIV

CHLAMYDIA TRACHOMATIS

- **D to K:** Cervicitis, endometritis, epididymitis, salpingitis, non-gonococcal urethritis, pelvic inflammatory disease

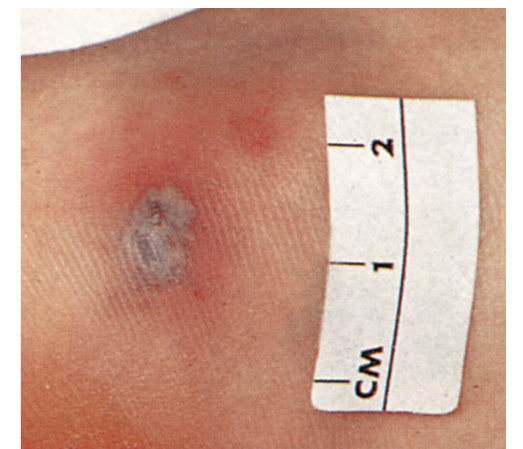
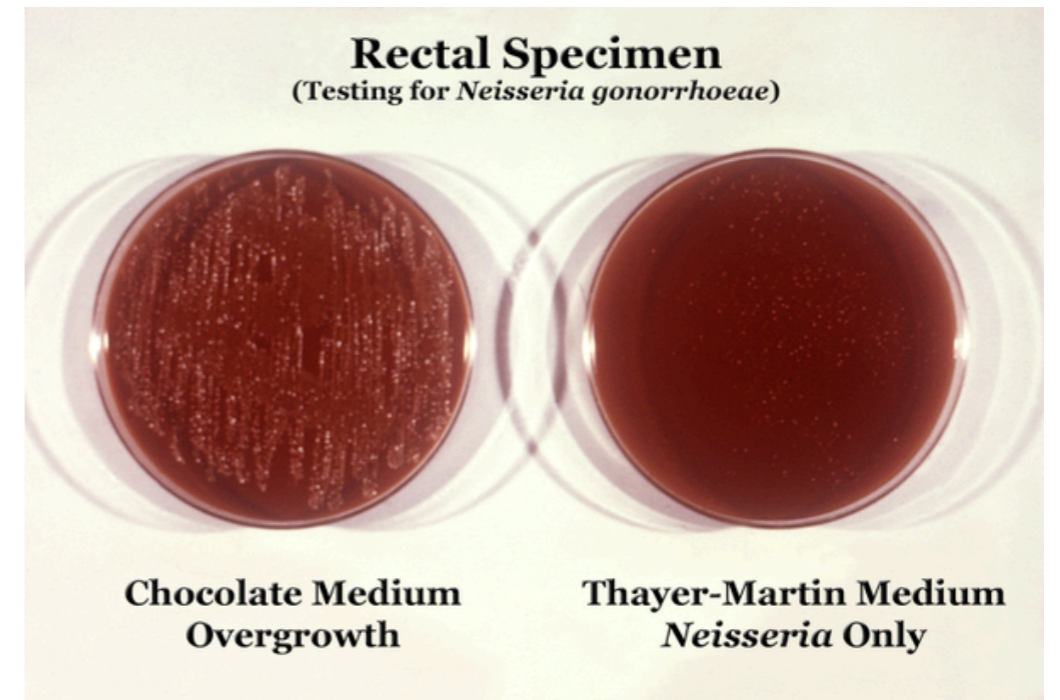
L1, L2, L3: Lymphogranuloma venereum

- **Diagnosis:**
 - Nucleic acid amplification tests (NAATs)
 - Ag detection:
 1. Direct immunofluorescence staining
 2. ELISA
 - Culture
- **Treatment:** Azithromycin, Doxycycline



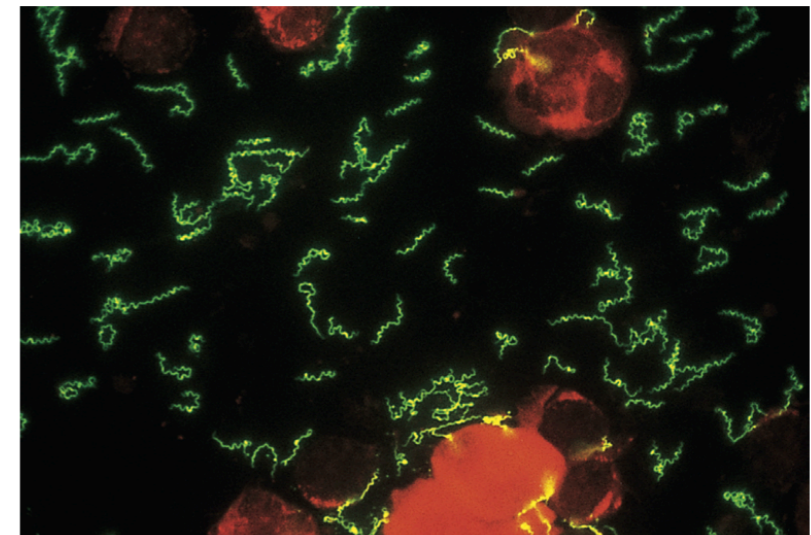
NEISSERIA GONORRHOEAE

- Purulent discharge, dysuria
 - **Men:** Urethra
Complications: epididymitis, prostatitis, periurethral abscess
 - **Women:** Cervix
Complications: salpingitis, tuboovarian abscess, pelvic inflammatory disease
 - Anorectal gonorrhoea, pharyngitis, purulent conjunctivitis, Fitz-Hugh-Curtis syndrome
- Diagnosis: Gram stain. Culture - chocolate agar, 35°C to 37°C, 5% carbon dioxide. NAATs.



TREPONEMA PALLIDUM

- Primary syphilis: painless chancre
- Secondary syphilis: fever, lymphadenopathy, skin rashes, condylomata lata
- Tertiary syphilis: Gummas, tabes dorsalis, general paresis, aortitis, Argyll Robertson pupil
- Congenital syphilis: bone and teeth malformations, blindness, deafness
- **Diagnosis:** Microscopy: Darkfield, direct fluorescent antibody test. PCR. Serology: Nontreponemal tests (cardiolipin, VDRL), specific treponemal tests (FTA-ABS, EIA)
- **Treatment:** Primary: Penicillin G. Congenital & late: 3 doses



OTHER AGENTS

- Haemophilus ducreyi:

- Chancroid: Papular lesion breaks down into painful bleeding ulcer with necrotic base
- Clinical diagnosis, exclusion
- Treatment: Erythromycin



- Ureaplasma urealyticum:

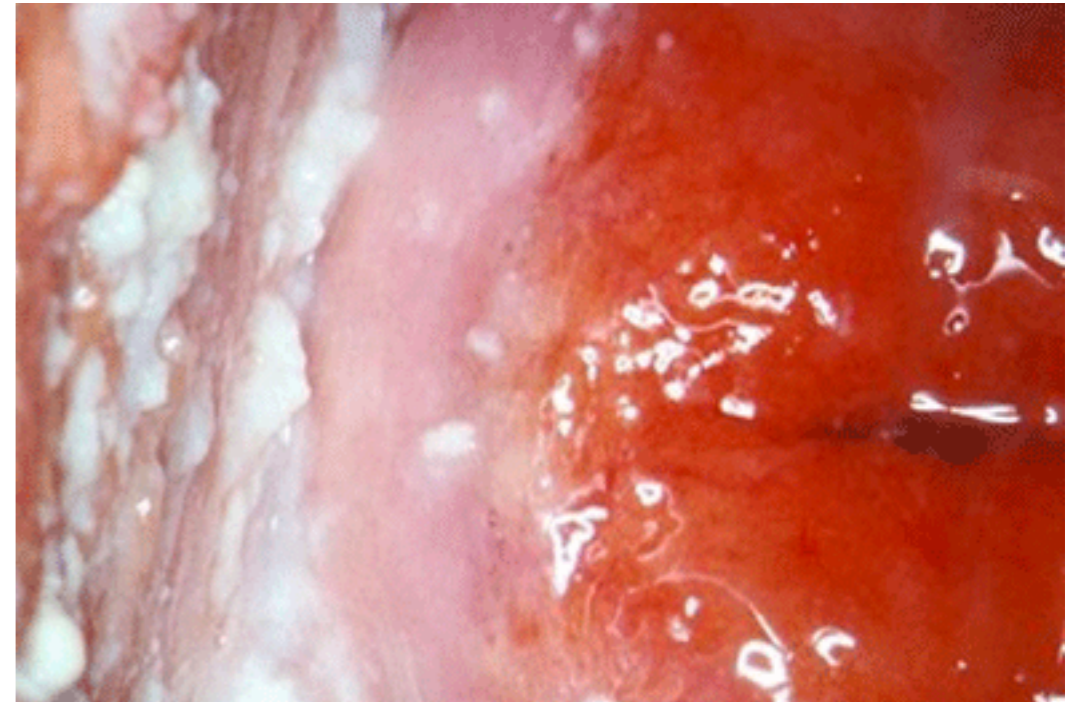
- Non-gonococcal urethritis, pyelonephritis, spontaneous abortion, premature birth
- Diagnosis: PCR. Culture: Supplemented with urea and buffer
- Treatment: Erythromycin



OTHER AGENTS

- Candida spp:

- Thick, cottage-cheese discharge, pruritus, erythema, edema, dysuria, pain during sexual intercourse
- Diagnosis: Direct microscopy. Culture - selective chromogenic medium. KOH prep.
- Treatment: Azoles



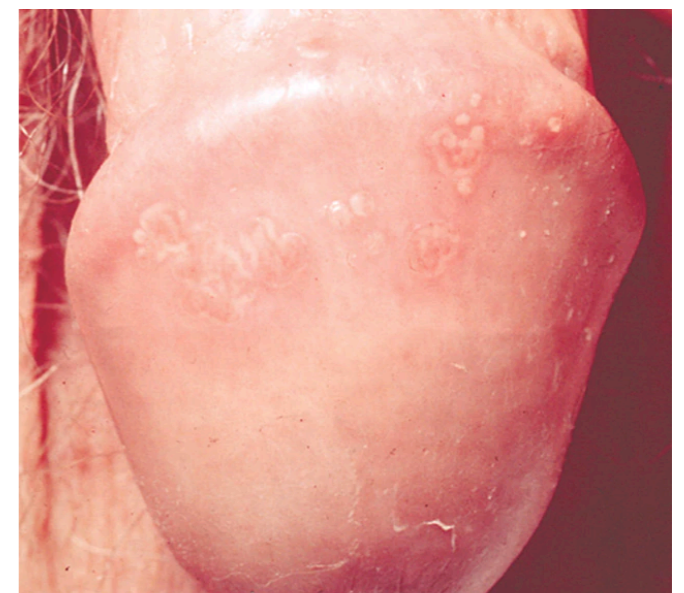
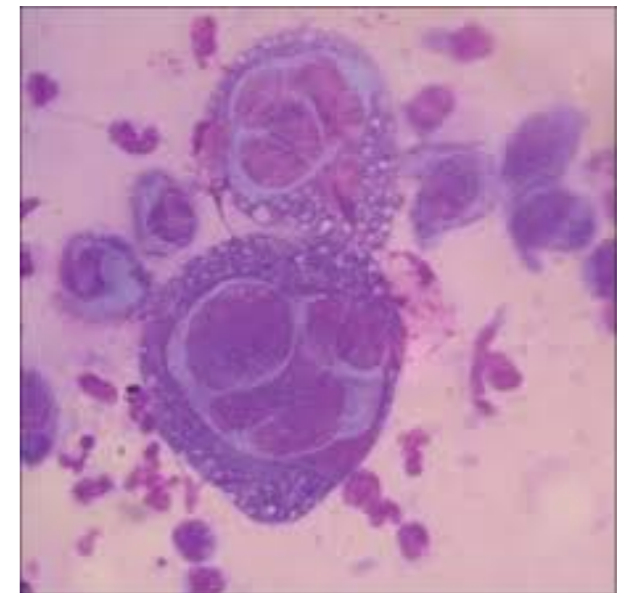
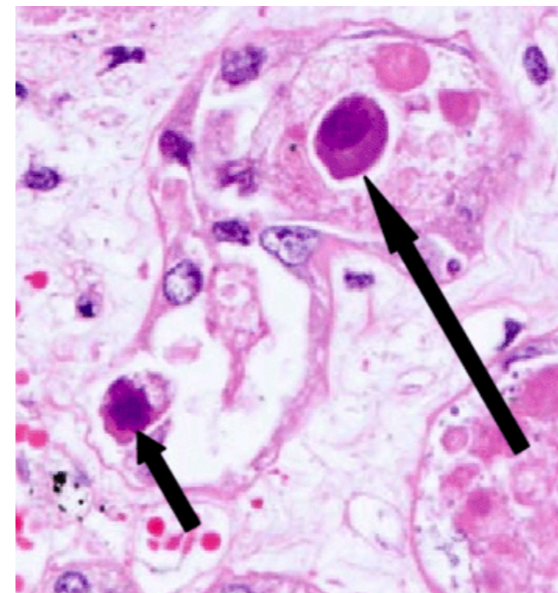
- Trichomonas vaginalis:

- Trichomoniasis: Vaginitis, strawberry cervix, yellow-green foul-smelling discharge
- Diagnosis: Stained (Giemsa, Pap) or unstained smears. Motile in wet mount. Culture. PCR.
- Treatment: Metronidazole



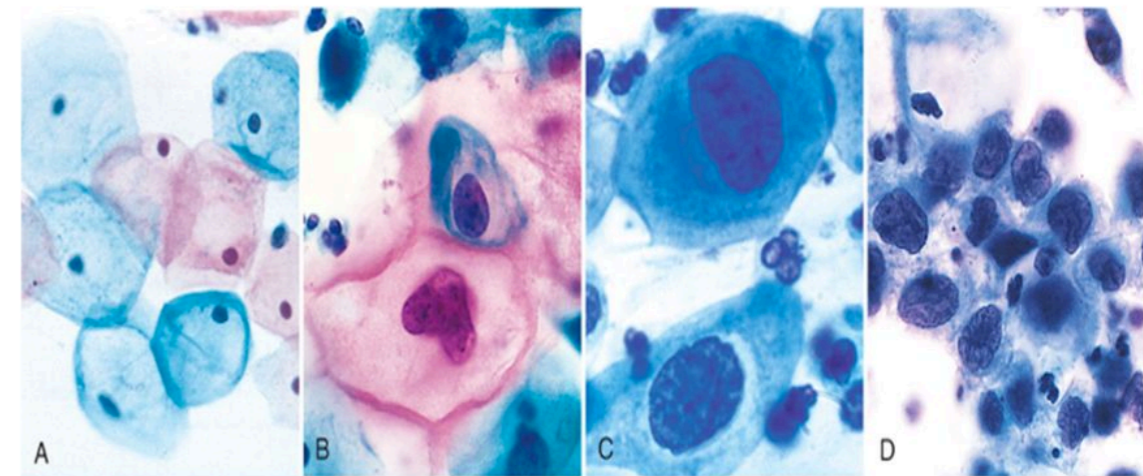
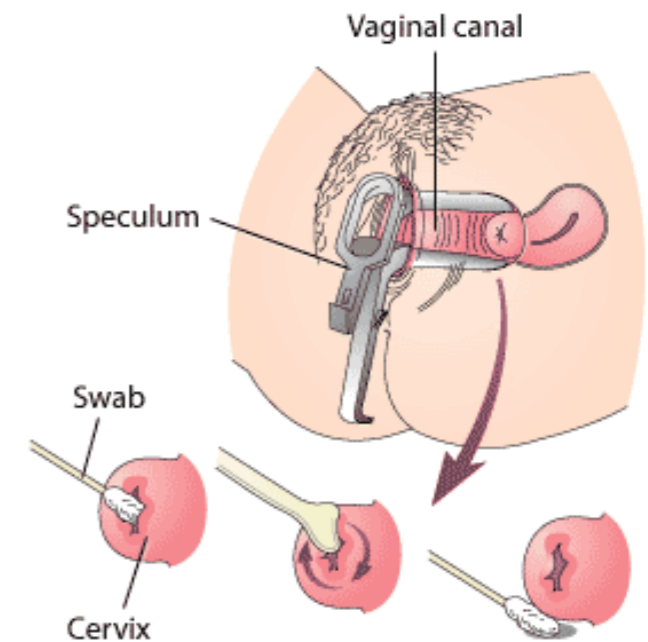
HERPES SIMPLEX VIRUSES 1 & 2

- Transmission: vesicle fluid, saliva, vaginal secretions, vertical
- Gingivostomatitis, herpetic labialis, keratoconjunctivitis, painful genital vesicles
- Encephalitis, meningitis
- Diagnosis:
 - Cowdry intranuclear inclusion bodies
 - Tzanck smear
 - Virus isolation in HeLa cells
 - PCR
- Treatment: Acyclovir



HUMAN PAPILLOMA VIRUS

- Asymptomatic - slight itching, warts
 - **Condyloma Acuminatum:** HPV-6, HPV-11
 - **Oral & laryngeal papilloma:** HPV-6, HPV-11
 - **Cervical intraepithelial neoplasia, cancer:** HPV-16, HPV-18
- Diagnosis: Papanicolaou smear - presence of koilocytotic cells. PCR.
- Vaccines:
 - tetravalent Gardasil (HPV 6, 11, 16, 18)
 - nine-valent Gardasil (HPV 6, 11, 16, 18, 31, 33, 45, 52, 58)
 - divalent Cervarix (HPV 16, 18)



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Normal

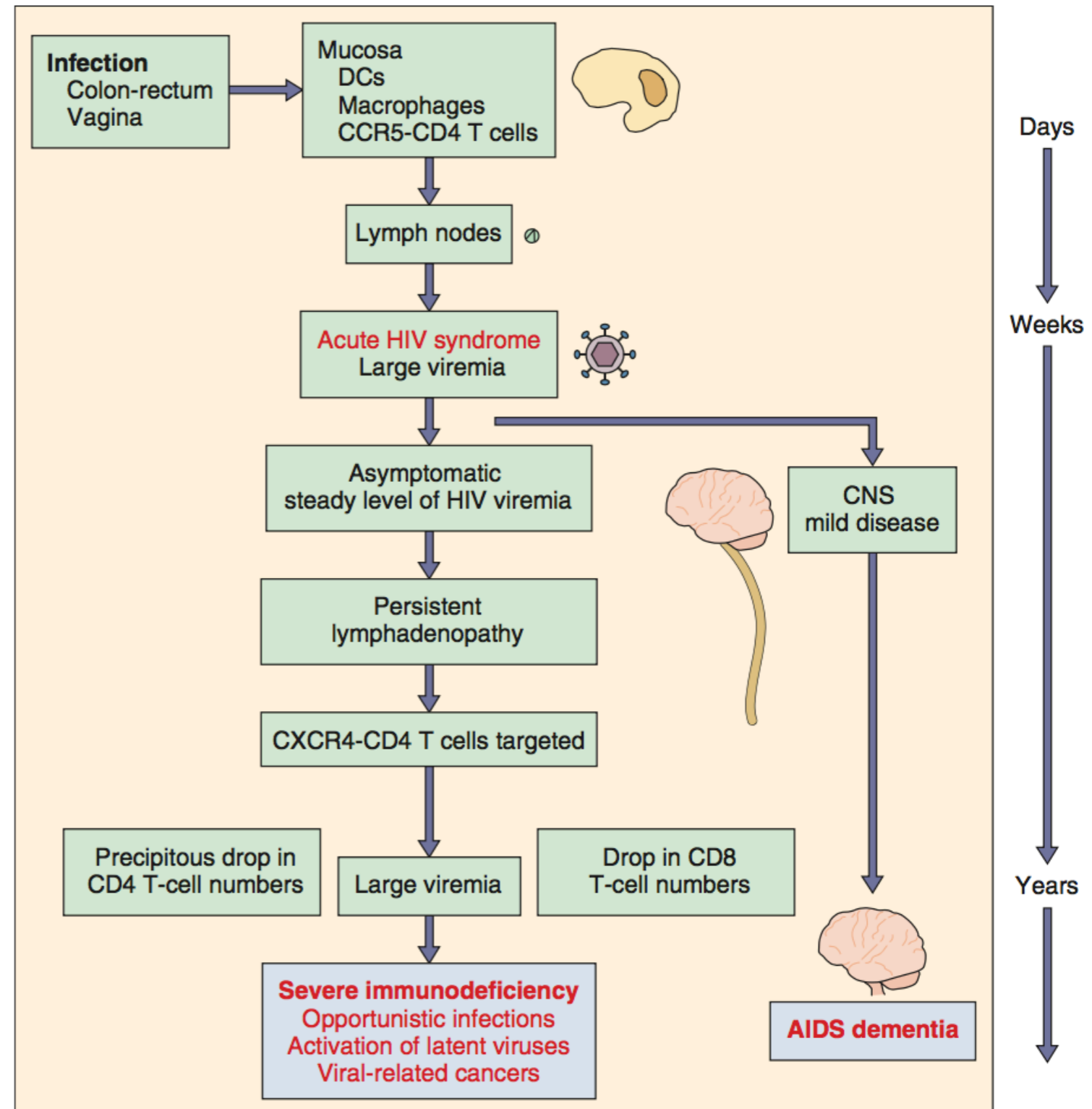
CIN I

CIN II

CIN III

HUMAN IMMUNODEFICIENCY VIRUS

- Transmission: blood, semen, vaginal secretions, vertical
- Diagnosis:
 - viral RNA: PCR
 - Ag detection: p24 Ag
 - Ab detection: anti-p24 - ELISA, confirm with Western blot
- Treatment: HAART
 - 2 NRTIs
 - 1 protease inhibitor/ integrase inhibitor/NNRTI



COMMON DISEASES OF HIV+ PATIENTS

PATHOGEN	PRESENTATION	FINDINGS
CD4+ cell count < 500/mm³		
<i>Candida albicans</i>	Oral thrush	Scrapable white plaque, pseudohyphae on microscopy
EBV	Oral hairy leukoplakia	Unscrapable white plaque on lateral tongue
HHV-8	Kaposi sarcoma	Biopsy with lymphocytic inflammation
HPV	Squamous cell carcinoma, commonly of anus (men who have sex with men) or cervix (women)	
CD4+ cell count < 200/mm³		
<i>Histoplasma capsulatum</i>	Fever, weight loss, fatigue, cough, dyspnea, nausea, vomiting, diarrhea	Oval yeast cells within macrophages
HIV	Dementia	
JC virus (reactivation)	Progressive multifocal leukoencephalopathy	Nonenhancing areas of demyelination on MRI
<i>Pneumocystis jirovecii</i>	<i>Pneumocystis</i> pneumonia	“Ground-glass” opacities on CXR
CD4+ cell count < 100/mm³		
<i>Aspergillus fumigatus</i>	Hemoptysis, pleuritic pain	Cavitation or infiltrates on chest imaging
<i>Bartonella henselae</i>	Bacillary angiomatosis	Biopsy with neutrophilic inflammation
<i>Candida albicans</i>	Esophagitis	White plaques on endoscopy; yeast and pseudohyphae on biopsy
CMV	Retinitis, esophagitis, colitis, pneumonitis, encephalitis	Linear ulcers on endoscopy, cotton-wool spots on funduscopy Biopsy reveals cells with intranuclear (owl eye) inclusion bodies
<i>Cryptococcus neoformans</i>	Meningitis	Encapsulated yeast on India ink stain or capsular antigen ⊕
<i>Cryptosporidium</i> spp.	Chronic, watery diarrhea	Acid-fast oocysts in stool
EBV	B-cell lymphoma (eg, non-Hodgkin lymphoma, CNS lymphoma)	CNS lymphoma—ring enhancing, may be solitary (vs <i>Toxoplasma</i>)
<i>Mycobacterium avium-intracellulare</i> , <i>Mycobacterium avium</i> complex	Nonspecific systemic symptoms (fever, night sweats, weight loss) or focal lymphadenitis	
<i>Toxoplasma gondii</i>	Brain abscesses	Multiple ring-enhancing lesions on MRI