



M15 -Urogenital and sexually-transmitted infections

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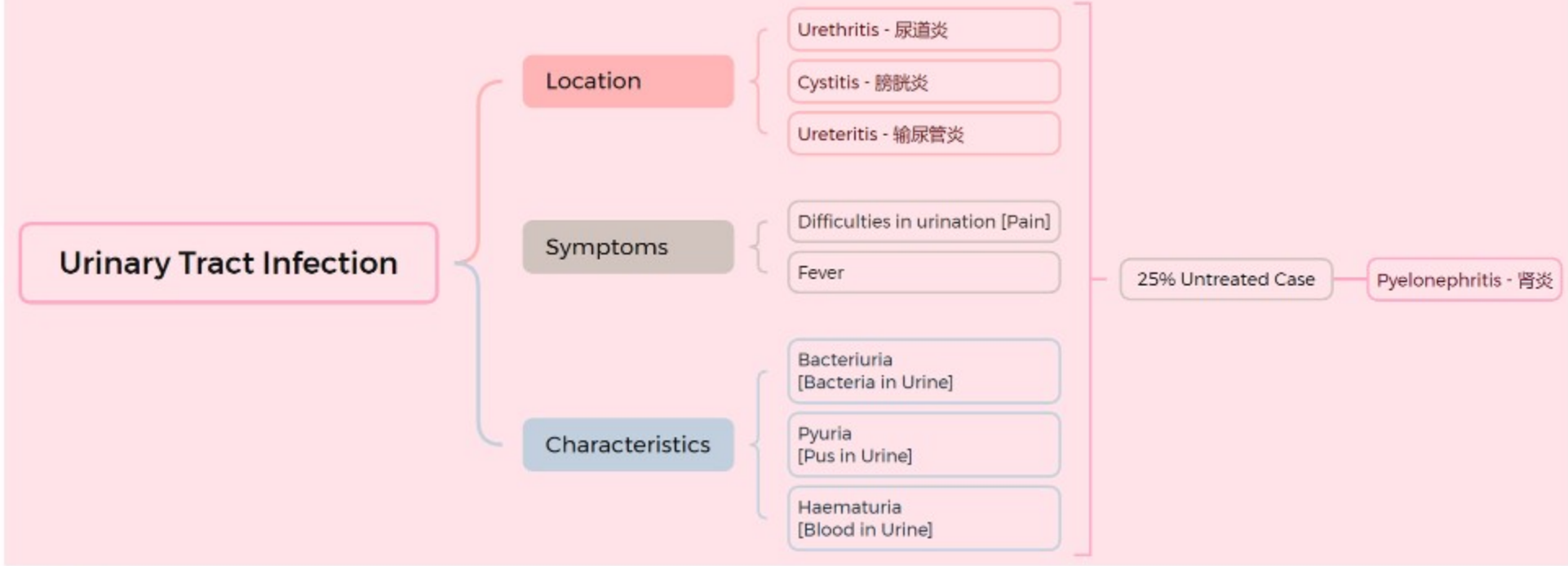
Learning Objectives

- Know what significant bacteriuria and pyuria are and the locations and names of different types of UTIs
- Name the common bacteria causing UTI and their likely sources
- Explain the laboratory diagnosis of UTI
- Know how to collect urine samples properly
- Describe the approach to a patient with an STI
- List the
 - Etiologic agents
 - Symptoms
 - Methods for diagnosis
 - Treatments
- Appreciate that STIs always infect more than one patient

Introduction to the Urogenital Infections

Urinary microbiome **Firmicutes** and **Bacteroidetes** account for most of the bacterial representations.
A disturbance of bacterial representation (Mostly **Enterobacteria**) and diversity triggers a transition from health to disease.

Clinical Features of Urogenital Infections



Text Version

Urinary Tract Infection

25% of Untreated Case → Pyelonephritis

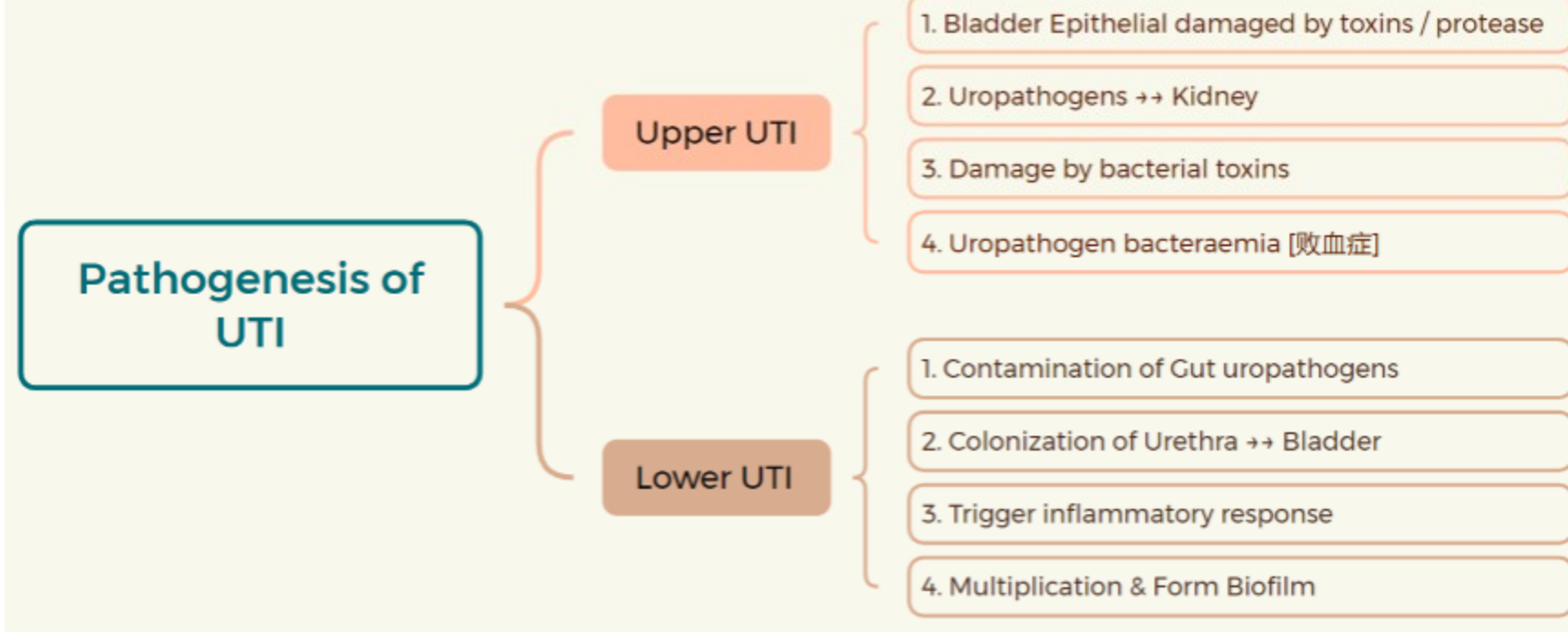
- Location
 - Urethritis - 尿道炎
 - Cystitis - 膀胱炎
 - Ureteritis - 输尿管炎
- Symptoms
 - Difficulties in urination (Pain)
 - Fever
- Characteristics
 - Bacteriuria
 - Pyuria
 - Haematuria

Common Urinary Tract Infection Pathogens

Most of the Urinary Tract Infection Pathogens are Enterobacteria

	Community patients	Hospital patients
1st Common	Escherichia coli	Escherichia coli
2nd Common	Staphylococci	Klebsiella Enterobacter Serratia Pseudomonas
3rd Common	Candida	G+ cocci / Proteus

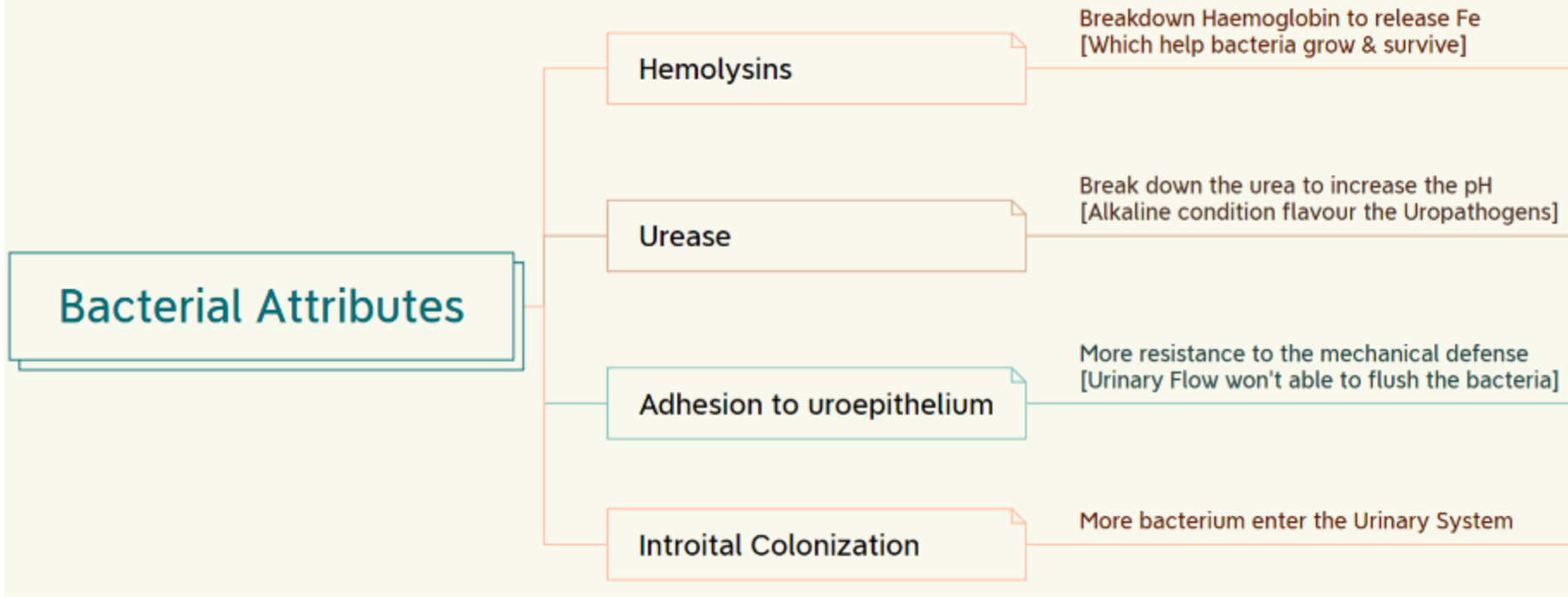
Pathogenesis of Urinary Tract Infection Pathogens



Text Version

- Upper UTI
 - 1. Bladder Epithelial damaged by toxins / protease
 - 2. Uropathogens → Kidney
 - 3. Damage by bacterial toxins
 - 4. Uropathogen bacteraemia (败血症)
- Lower UTI
 - 1. Contamination of Gut uropathogens
 - 2. Colonization of Urethra → Bladder
 - 3. Trigger inflammatory response
 - 4. Multiplication & Form Biofilm

Bacterial Attributes & Pathogenesis



Text Version

- Hemolysins
 - Breakdown Hemoglobin to release Fe (Which help bacteria grow & survive)
- Urease
 - Break down the urea to increase the pH (Alkaline condition favors the Uropathogens)
- Adhesion to uroepithelium
 - More resistance to the mechanical defense (Urinary flow won't able to flush the bacteria)
- Intratotal Colonization
 - More bacterium enter the Urinary System

Introduction to Sexually Transmitted Infections [STI]

Accurate Diagnosis → Compliance → Treatment on epidemiological → Follow up → Screening and contact tracing → Education

Remarks: 精确的诊断 → 遵守治疗 → 基于流行病学的治疗 → 后续随访 → 筛查和接触追踪 → 教育

Remarks:

- Diseases that are transmitted mainly, but NOT EXCLUSIVELY, by sexual contact
- STI can be transmitted through Horizontal Transmission & Vertical Transmission
- History Contact is important → Prevent re-infection & Break the chain of transmission → Treat Asymptomatic Infection

Most common STI

Pathogen	Disease	Chinese Translation	Treatment	Remarks
Chlamydia trachomatis (D-K serotypes)	Non-specific UTI	非特异性尿道炎	Doxycycline, azithromycin	
Trichomonas vaginalis (Parasites)	Vaginitis, urethritis	阴道炎, 尿道炎	Metronidazole	
Neisseria gonorrhoeae	Gonorrhea	淋病	Common antibiotic	
HIV	AIDS	艾滋病	HAART	
Papillomavirus	Genital warts	生殖腺湿疣	Surgical	HPV16, HPV18 → cervical cancer (子宫颈癌)
Hepatitis (HSV-2/HSV-1)	Genital herpes	生殖腺疱疹	Acyclovir	Latency 潜伏性
Treponema pallidum	Syphilis	梅毒	Penicillin	
C. trachomatis (L1, L2, L3 serotypes)	Lymphogranuloma venereum	性淋巴肉芽肿	Doxycycline, erythromycin	Tropical regions
Candida albicans	Vaginal thrush	阴道念珠菌病	Nystatin, fluconazole	Predisposing factors 诱发因素
HIV	Hepatitis	肝炎	Lamivudine	Male homosexual
Haemophilus ducreyi	Chancroid	甲状旁腺脓肿	Erythromycin	Mainly tropical

Female anatomical sites affected by more common STIs

Pathogens	Infected Location	Located Cell Type
Gonorrhoea	- Cervix - Oral - Rectal	Intermediate endocervical columnar epithelial cells
Chlamydia	- Cervix - Oral (Rare) - Rectal	Basal endocervical columnar epithelial cells
Bacterial vaginosis	- Vagina / Internal genitalia	Vaginal Epithelium
Trichomoniasis	- Vagina / Internal genitalia	Vaginal Epithelium
HSV	- Vulva / External Genitalia - Oral - Rectal	Epidermal Cell Squamous Epidermal Cell
HPV	- Vulva / External Genitalia - Oral - Rectal	Epidermal Cell Squamous Epidermal Cell

Remarks:

- Gonorrhoea and chlamydia typically present as cervicitis 淋病和衣原体感染常表现为宫颈炎。
- Bacterial vaginosis (BV) and trichomoniasis CAN ALSO cause cervicitis, but more commonly manifest as vaginitis. 细菌性阴道病 (BV) 和滴虫性阴道炎也会导致宫颈炎, 但更常见的表现为阴道炎。
- HSV and HPV most typically affect the vulva or external genitalia of women HSV 和 HPV 最常影响女性的外阴部或外生殖器。

More About Sexually Transmitted Infections

Neisseria Gonorrhoeae



- Neisseria spp. is diplococci β-haemolytic
- Need to be cultured in Thayer-Martin medium culture



Gonorrhoea

Male Patients	Female Patients
Painful urination	Initial: Asymptomatic
Discharge of pus	Later: Spread to the fallopian tubes [Salpingitis] 扩散到输卵管(输卵管炎)
Blockage of the urethra	Important reservoirs → Multiple sexual partners
Sterility	

Nongonococcal Urethritis (NGU)

NGU is any inflammation of the urethra NOT CAUSED by N. gonorrhoeae.

Pathogens	- Chlamydia trachomatis (L1, L2, L3 serotypes) - Ureaplasma urealyticum - Mycoplasma hominis
Symptoms	- Milder than Gonorrhoea - Urethral discharge - Dysuria
Complications	- Salpingitis - Sterility

Treponema pallidum / Spirochete - Syphilis

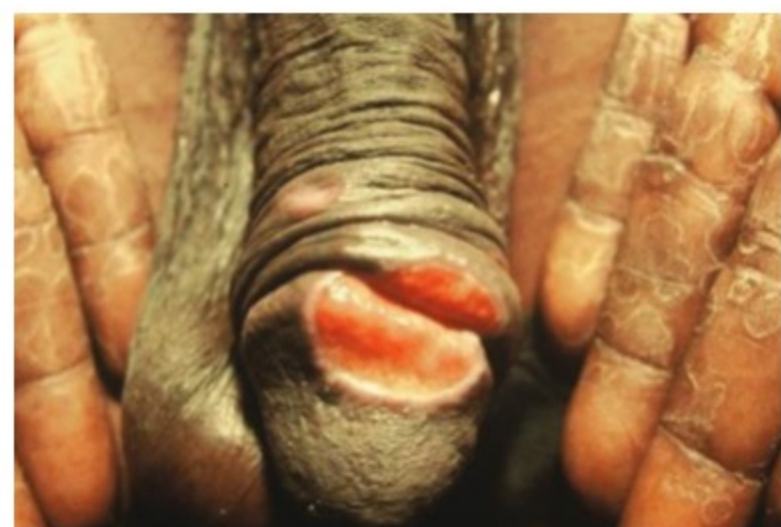
- Cannot be cultured in vitro
- 1. Fluorescent treponemal antibody-absorption test
- 2. VDRL test - By using Patient's serum

- Initial Infection
 - Multiplication of treponemes at site of infection
- Primary syphilis
 - Proliferation of treponemes in regional lymph nodes
- Secondary syphilis
 - Multiplication and production of lesions in lymph nodes, liver, muscle, skin and mucous membrane
- Latent Syphilis
 - Treponemes dormant in liver and spleen
- Tertiary Syphilis

Transmission Method	Direct contact of intact mucous membrane Direct contact of breaks in skin with lesions
Primary	Lesion: Chancere [A firm, painless ulcer] Chancere can heal spontaneously, without treatment Invade the blood & lymphatic system Enlarged inguinal lymph nodes
Secondary	Flu-like illness Generalized Mucocutaneous rash on skin Myalgia - 肌肉痛 Headache, Fever
Tertiary	Neurosyphilis Cardiovascular syphilis Progressive destructive disease

Remarks:

- Not to be confused with chancroid, which is typically very, very painful and is caused by Haemophilus ducreyi.



Chancere

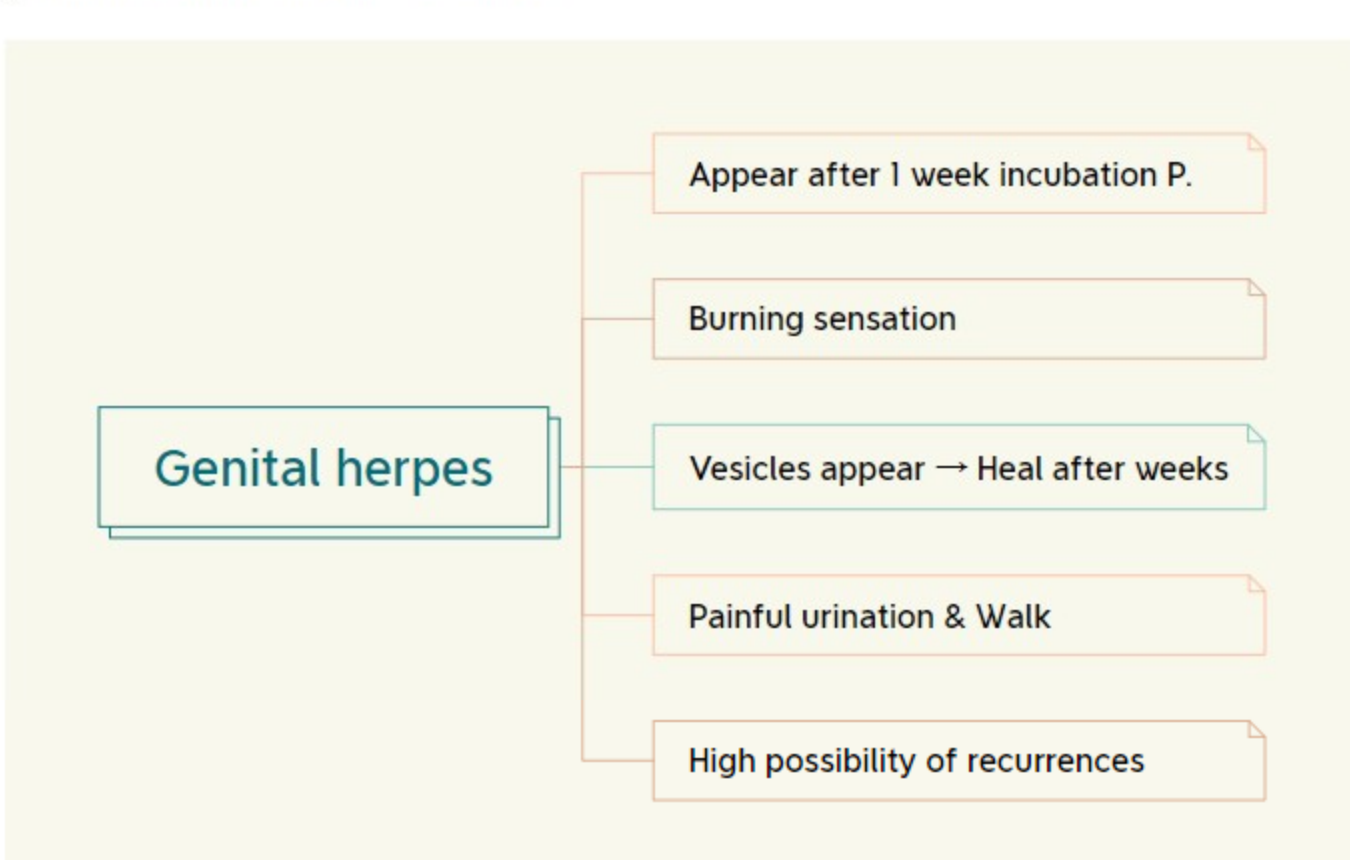


Generalized Mucocutaneous rash on skin

Viral Sexually Transmitted Infections

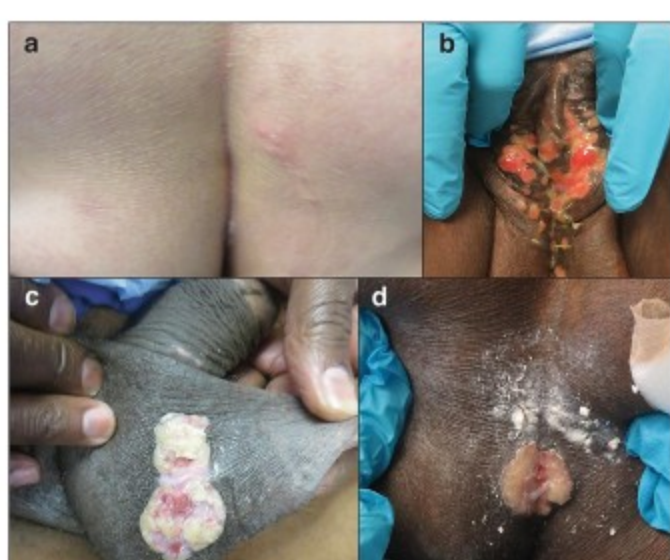
Herpesvirus - Genital herpes

HSV-2 is more common than HSV-1

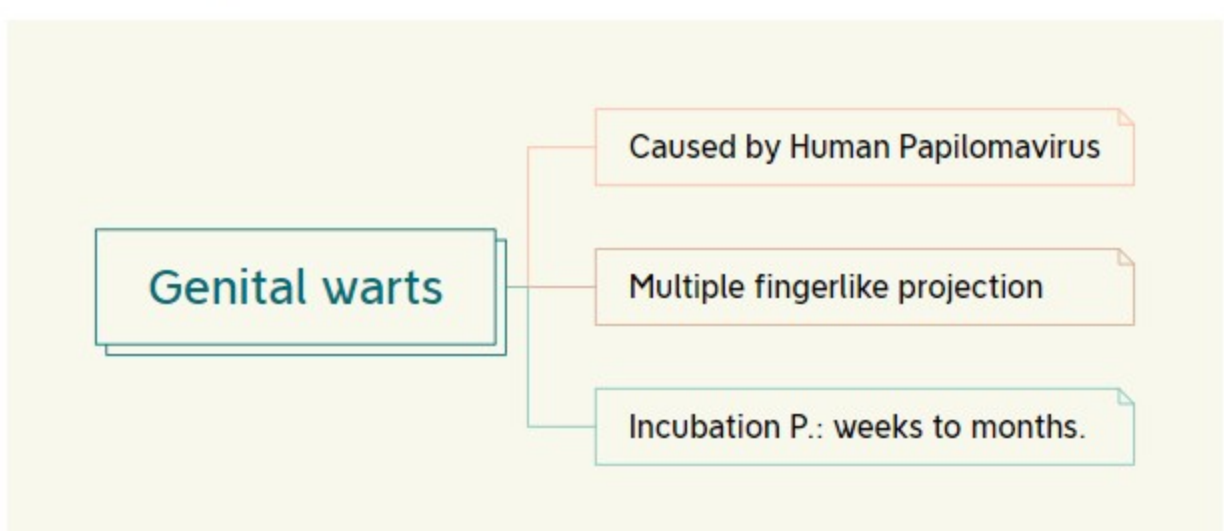


Text Version

- Lesions appear after an incubation period of about 1 week and cause a burning sensation.
- Vesicles appear.
- Painful urination and discomfort while walking.
- Vesicles usually heal in a couple of weeks.
- About 88% of HSV-2 patients and 50% of HSV-1 patients will have recurrences in 3-6 month intervals.



Human Papillomavirus - Genital warts



Text version

- Genital warts are caused by papillomaviruses.
- Warts are multiple fingerlike projections
- The incubation time is weeks to months.
- Leads to cervical cancer

