Genitio -- Urinary

Urinary -- strictly excretory system:
- kidneys
- ureters normally sterile
- bladder
- urethra--tip has flora from skin
- flushing action of urine
  - pH
  - relative lack of nutrients
  - final aperture of urethra -- sphincter muscle closes it

Urinary tract
- inf. very common in clinical practice
- increased risk for infection because of proximity to anus
- in men urethra ~8 inches [20cm]
- in women it is shorter: 1.5inches [4cm] long RESULT--higher risk for women

Genitalia
- intercourse from a pathogen's viewpoint=moist sexual organs
- Sexually Transmitted Disease [STD]
- ORGANS: vagina, cervix, uterus
- accessible to outside world.
- esp. moist in female during menstrual shedding -- raw surface
  - blood is nutrient rich
- -Hormonal changes -- microenvironment changes drastically every few days =difficult
- for normal non-pathogenic bacteria to establish themselves

Countering Risk:
- flushing action of urine
- uninterrupted flow of menstrual blood

Vagina
- normal flora = lactobacilli => acid pH inhibits other bacteria
- glycogen (estrogen-stimulated) stored in cells of
- vaginal lining (shed during menstruation)

Lactobacilli die in post-menopausal women
- increases risk of vaginal infections
– infections of urinary tract

KIDNEY INFECTIONS
Ascending infections most common from peri-anal region

Descending infections -- blood born seeding
– kidney
slow circulation: kidney, lung, liver

Inf. Ascending to kidney
nephritis-
site of the major infection is in the urine collecting area
[called the calysis] and
the pelvis of the kidney [its waist]

infection in urine collecting parts rather than in the filtration units

"Honeymoon" cystitis--caused by bacteria common in the perianal region
urinary infections:

90% infections come from a person’s own gut flora
E. coli, enterobacteria
Proteus
Enterobacter
Pseudomonus aeruginasa -- antibiotic resistant

A case
19 yr female
previous UTI, amp treated
5d nausea, 4 d pain in left flank, fever, chills, freq. urination
current 38.8 C,
tender costo-vertebral angle [last ribs join vertebrae
Lab work
clean catch urine shows
- >50 wbc/hpf
- 6 rbc
- >100,000 on sheep bc agar [b-hemo] and MacConkey agar

diagnosis:
UTI
pyuria = >10wbc/hpf
hematuria [rbc in urine]
visible bacteria in urine
lots of bac. on culture

Pyelonephritis
kidney inf.

Cystitis
bladder inf.

E. coli virulence factors
adhesion: fimbriae bind epithelial cells
types:
P causes 80% of E. coli pyelonephritis found also on the P blood group antigen
type 1 ....causes cystitis, rbc adh,
mannose blocks
hemolysis
- 55% of the E. coli in pyelonephritis do this
kills not just rbc,kills renal tubular cells = direct kidney damage
aerobactin– a siderophore [ iron chelators] growth advantage

Genital Tract Infections
Neisseria gonorrhoeae --smear from urethral pus,
EM showing pili

G - round bac
naming the disease:
(genital) gono + rrhea (discharge)
ONLY a human reservoir, sexual trans. [STD]

mechanism:
pili attach urethra, vagina, fallopian tubes
evade the immune system by several mechanisms

including shuffle of DNA that codes for pili

opA also
generates antigenic variations

porins
1. PMNs & Mac kill by free radicals, these are inhibited by N. gonorrhea
2. induce local release of TNF-alpha

Pillins:
1. phase variation

2. vary from one copy of the gene to another
mc2 is the most variable
the regions between the mc [microcassettes] are highly homologous & genetic recombination can occur in these regions

– pil S silent pili gene
– pil E expressed pili gene

3. pilC and opa showing slip-stranded synthesis, alternate products or phase variation results

another virulence factor IgA-ase

pus, inflammation, swelling
scarring

WOMEN
urethra --> preventing urine flow
cervix
fallopian tubes: sterility or ecotopic pregnancy
uterus --> pelvic inflammatory disease

BABIES
eyes & mouth; ophthalmia neonatorum

MEN
prostate
testes

Syphilis: Treponema pallidum
spirochete
only a HUMAN reservoir, sexually transmitted [STD]

1st stage of syphilis
discrete area on skin or [rarely] urethra
local ulcer -- a chancre
epithelial cell attachment, ICAM-1 induced
walls itself in by immune response

2nd stage of syphilus
skin rashes

3rd stage of syphilus
joint pain & loss of function
nervous system damage
varied presentation
– 1. stroke
– 2. insanity

mothers --> in utero
syphilitic faeces
1. tooth malformation
2. skeletal abnormalities
Chlamydia trachomatis
– intracellular inf. 
5% of people -- normal flora -- not pathogenic 
acute inflammation, pus & pain 
characterized by intracellular colonization 
damage to urethral lining -- path like gonorrhea 

Haemophilus ducreyi -- chancroid lesion, G - rod 
– exquisitely painful 

Viral genital diseases: 

Herpes Simplex type 2 
life cycle 

Papillomaviruses 
– HPV16 -- genital warts and worse: cervical cancer 
PAP smear 
more than one nucleus/cell, clear area around nucleus 
Vaccine NOW! recommended for all teenage women 

Toxic Shock Syndrome 
similar to food poisoning 
Staph aureus -- contamination of a tampon-- blood as food source 

high absorbency was the problem--incidence 
– Toxic shock toxin 
--> T lymphocytes --> cytokines --> fever & shock 

HIV 
pandemic, 

fatal 
spread Only blocked by prevention 
final stage called AIDS
CD4+ cells: T cells [helpers], macrophages, dendritic cells and microglial cells, infects by fusion.

*More on HIV in blood infections section.

Fungal Infections
CANDIDITIS IS THE MOST COMMON caused by CANDIDA ALBICANS
dimorphic single celled yeast or multicelled mycelliar form [mold]
Candida inf. more common with immunodeficiency
Candida depend on environ TOO since if normal flora disturbed--inf.
Candida grows just under the skin
toxins induce secretion of inflammatory mediators. This means symptoms exceed the actual inf.

Trichomonas vaginalis
from asymptomatic to burning holes in cloth