

**Institute for Microbiology, Medical Faculty of Masaryk University
and St. Anna Faculty Hospital in Brno**

Agents of urinary tract infections

Urinary tract infections (UTIs)

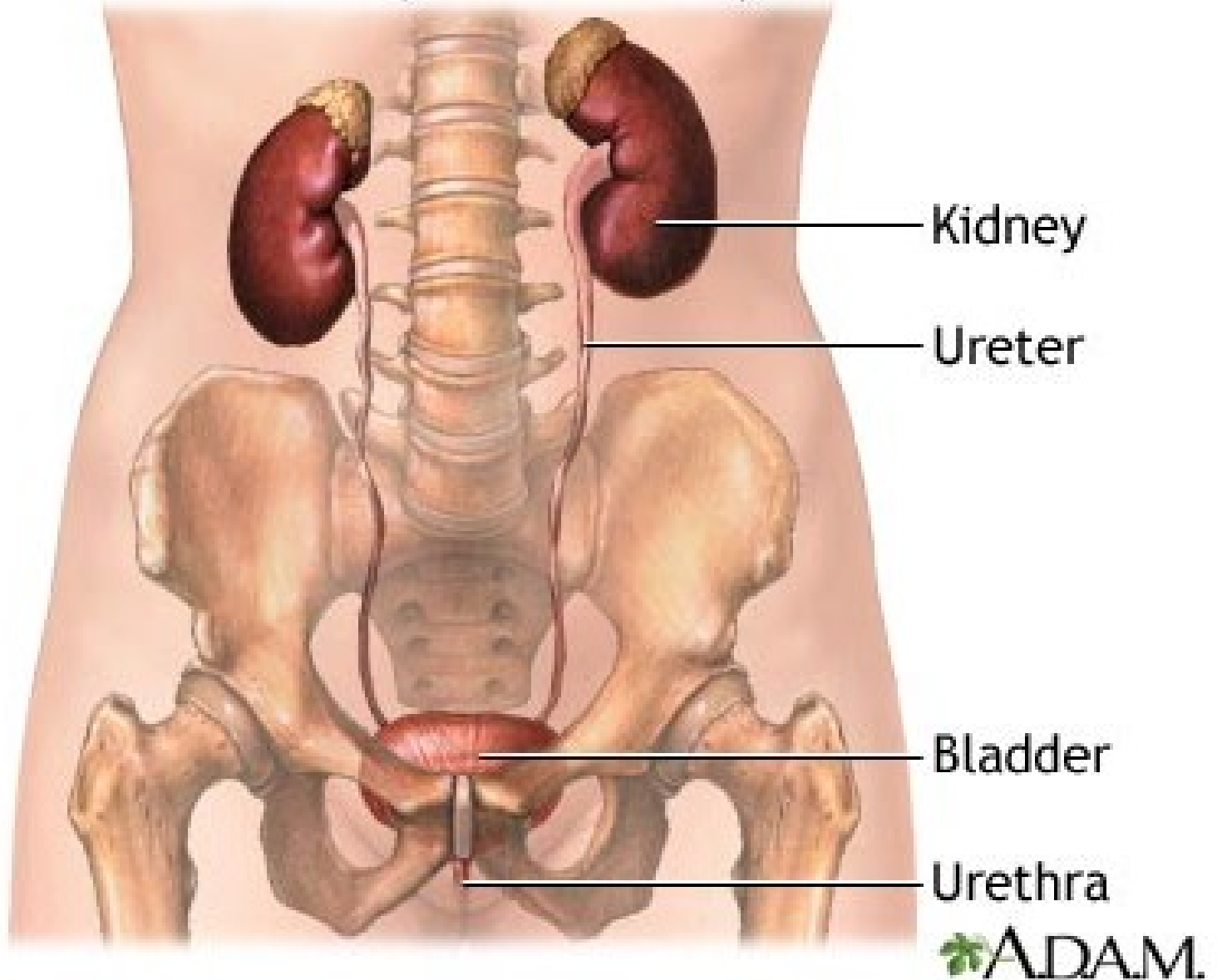
Frequency of UTIs:

The 2nd most common infections (after respiratory ones)

In adults: the most common infections

Afflicting mainly females (because of shorter urethra)

Normal anatomy of the urinary tract



Examples of UTIs I

The most common UTI:

Cystitis - develops **ascendently** caused by **intestinal microflora**

Symptoms:

dysuria (difficult urination with sharp and burning pain)

pollakisuria (urgent need to urinate accompanied by urination of a small amount of urine only)

Examples of UTIs II

Other UTIs:

mainly pyelonephritis (more serious)

origin: ascendent or hematogenous

Symptoms:

fever, chills, flank pain, or
costovertebral tenderness, urinary
frequency, dysuria, hematuria

urethritis – will be dealt with STD

Etiology of UTIs

Proportional representation of microbes **differs** in:

- **non-complicated** UTIs
- infections accompanying **structural abnormalities** (prostatic hypertrophy, urinary stones, strictures, pregnancy, congenital defects, permanent catheters)
- infections accompanying **functional disorders** (vesicoureteral reflux, neurological disorders, diabetes mellitus)

Etiology of non-complicated UTIs

80 % *Escherichia coli*

10 % enterococci (*Enterococcus faecalis*)

5 % *Proteus mirabilis*

other enterobacteria (*Klebsiella pneumoniae*,
Kl. oxytoca, *Ent. cloacae*, *C. freundii* etc.)

Streptococcus agalactiae

coagulase neg. staphylococci (*S. epidermidis*,
S. saprophyticus, *S. haemolyticus* etc.)

yeasts (mainly *Candida albicans*)







www.medmicro.info



<http://biology.clc.uc.edu>

Etiology of complicated UTIs

circa 80 %: *Escherichia coli*

Klebsiella pneumoniae

Proteus mirabilis

Pseudomonas aeruginosa

enterococci

other enterobacteria

acinetobacters

other G-neg. non-fermenting rods

candidae

***Lege artis* taking a urine sample**

- 1. Only after a thorough cleaning of genital incl. external orificium of urethra by means of soap and water**
- 2. Take the middle stream of urine only**
- 3. Use a guaranteed sterile vessel**
- 4. Pour it into a sterile tube & stopper promptly**
- 5. If not possible to process it within 2 hours, place the specimen into 4 °C for 18 hours at most**

COUNTERTHINK

EXPENSIVE URINE

PROZAC : \$143
LIPITOR : \$129
BLOCADREN : \$83
VASOTEC : \$64
PLENDIL : \$85
CHEMOTHERAPY : \$1,350

\$1,854 PER MONTH



QUALITY MULTIVITAMIN : \$28
SUPERFOOD SUPPLEMENT : \$45
MEDICINAL HERBS : \$75
FRESH PRODUCE DAILY : \$225
AGED GARLIC EXTRACT : \$13
POMEGRANATE JUICE : \$60

\$446 PER MONTH

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CONCEPT - MIKE ADAMS

ART - DAN BERGER

WWW.NEWSTARGET.COM

Semi-quantitative examination of the urine sample – I

We are interested

- not only **in the kind of microbe** present in the urine sample, but especially
- **in the amount of the microbe**

Why are we interested in the **number** of microbes in 1 ml of urine?

Because

- **high numbers** only stand for the UTI
- **low numbers** mean usually **contamination** acquired during urination

Semi-quantitative examination of the urine sample – II

Therefore, the **urine is inoculated** on culture media by means of a **calibrated loop**, usually taking **1 μ l** of urine

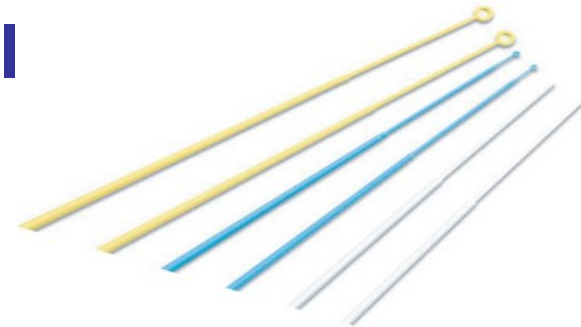
In this case

1 colony means 10^3 CFU/ml

10 colonies mean 10^4 CFU/ml

100 colonies mean 10^5 CFU/ml


(CFU = colony-forming unit = 1 cell)



Significant concentrations of bacteria in urine

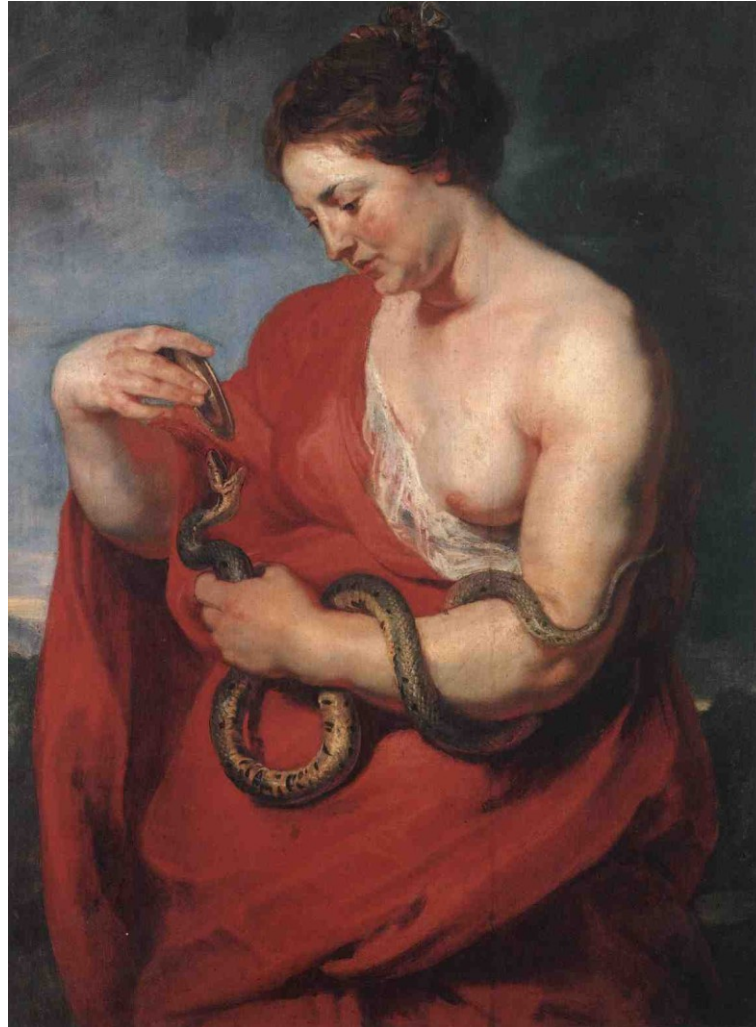
Type of specimen, symptoms	Type of microbe	Significant number (CFU/ml)
Middle stream, symptoms present	Primary urine pathogen	10^3
	Dubious urine pathogen	10^5
Middle stream, no symptoms	Any	10^5
Suprapubic puncture	Any	10^1

Therapy

- Trimethoprim-sulfamethoxazole
 - Nitrofurantoin
 - Cephalexin
 - Fluoroquinolones
 - Amoxicillin-clavulanate
 - in complicated UTIs ATB sensitivity assessment
 - **ESBL strains**
- 

Homework 3 – solution

Paulus Peeter Rubens (1577-1640): Goddess of health Hygiene (1615)



Homework 3 – detail

Paulus Peeter Rubens (1577-1640): Goddess of health Hygiene (1615)



Homework 4

Who painted this picture and what is its name?

