Lecture 5 – Part-2

Bacterial taxonomy, Classification, and laboratory diagnosis

Vitek system

Urine culture technique

Blood culture

Vitek system

Vitek system

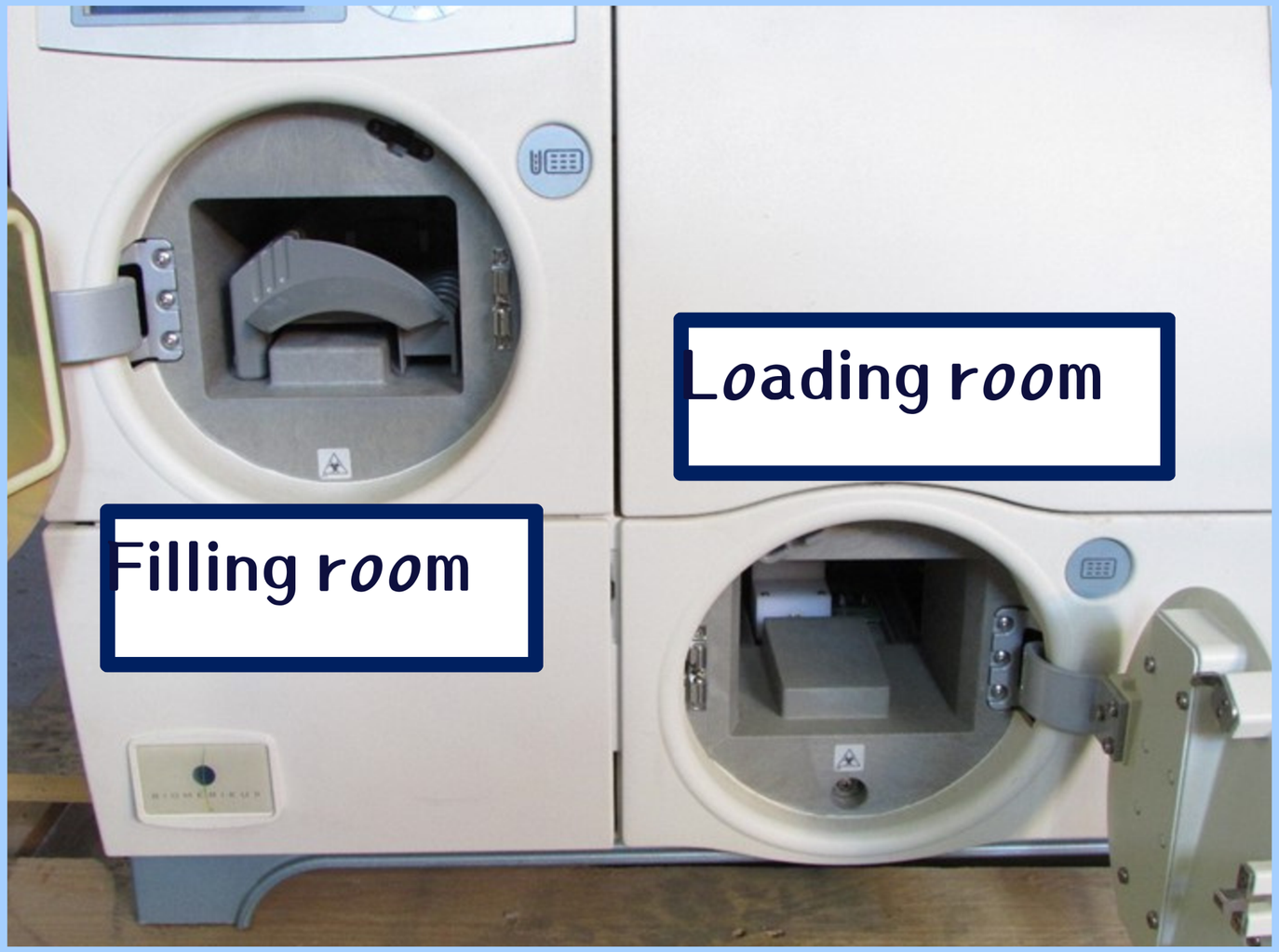
An automated

Identification

Antibiogram

Antifungals

Vitek system



Vitek system

** Two cards

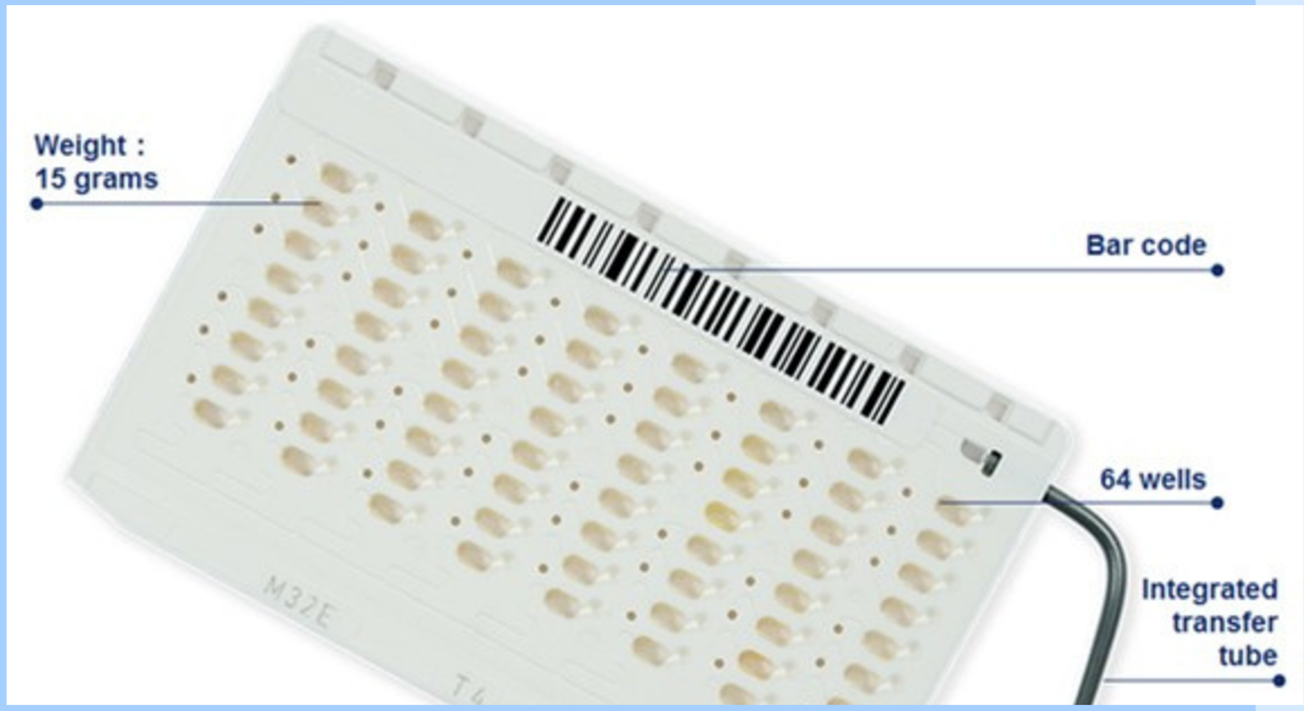
I) Identification card (ID card)

47 biochemical tests

Specific Card for GN

Specific Card for GP

Specific Card for Yeast



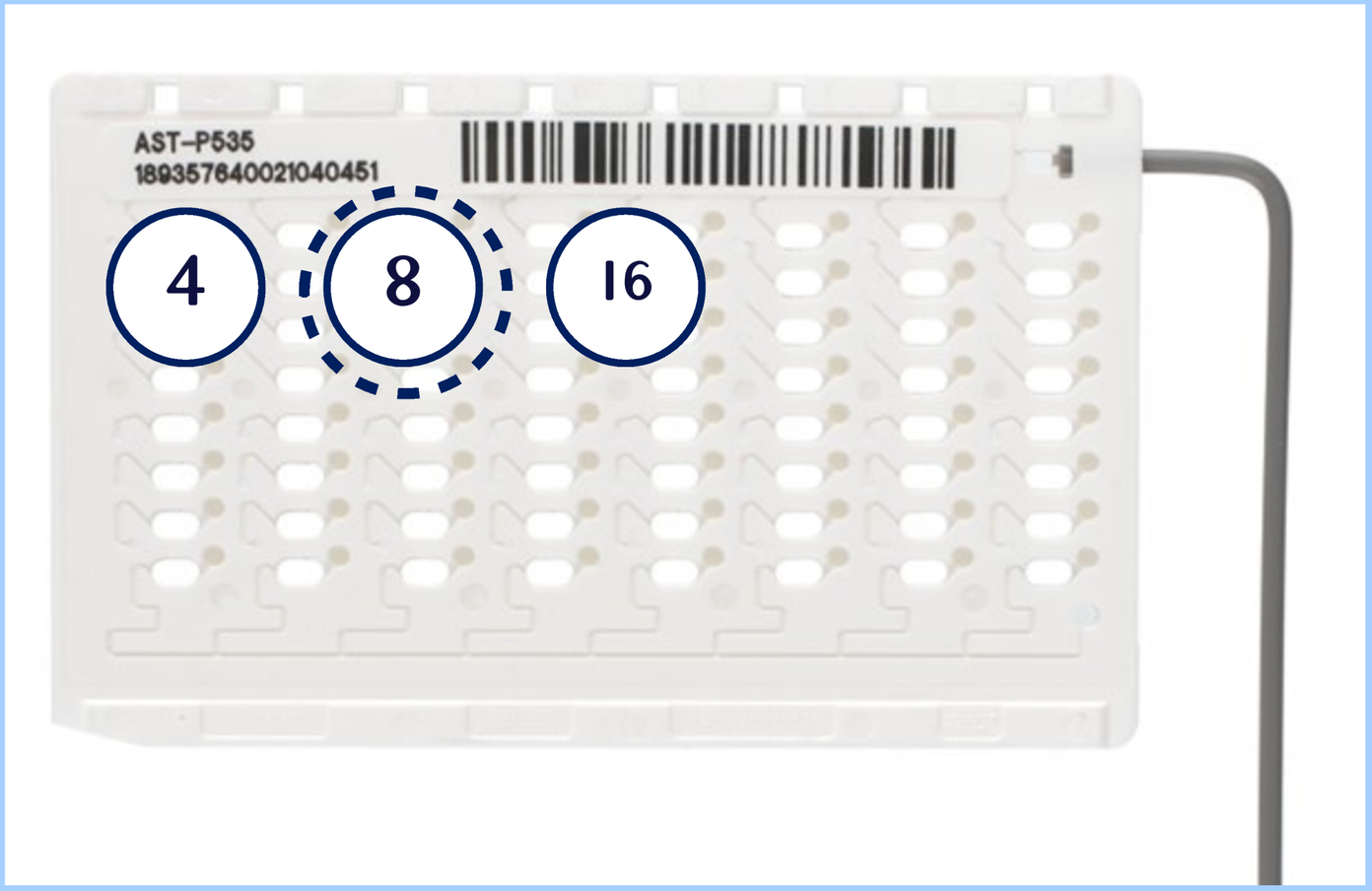
Vitek system

2) Antimicrobial susceptibility test card

(AST card)

22 antibiotics

MIC



Steps of work

1

Organism isolation

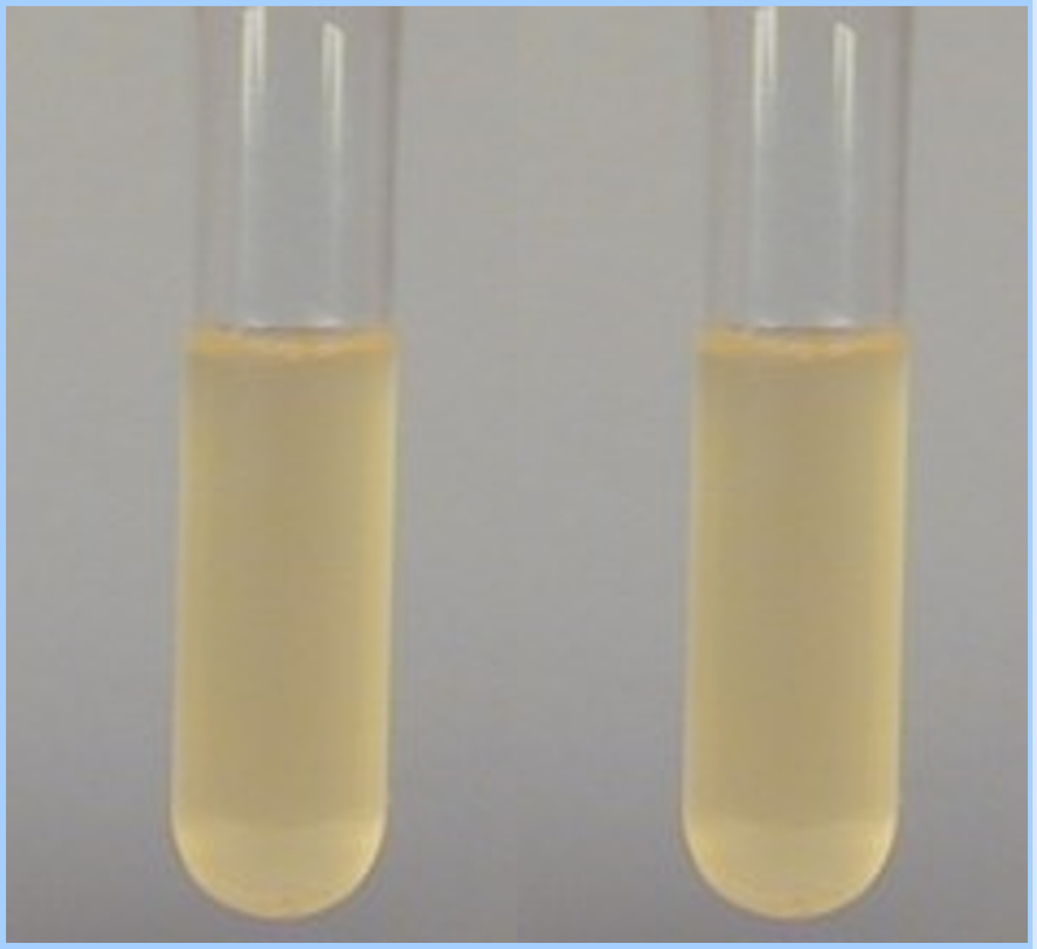
(Pure)

Steps of work

2

Bacterial suspension

(2 tubes)



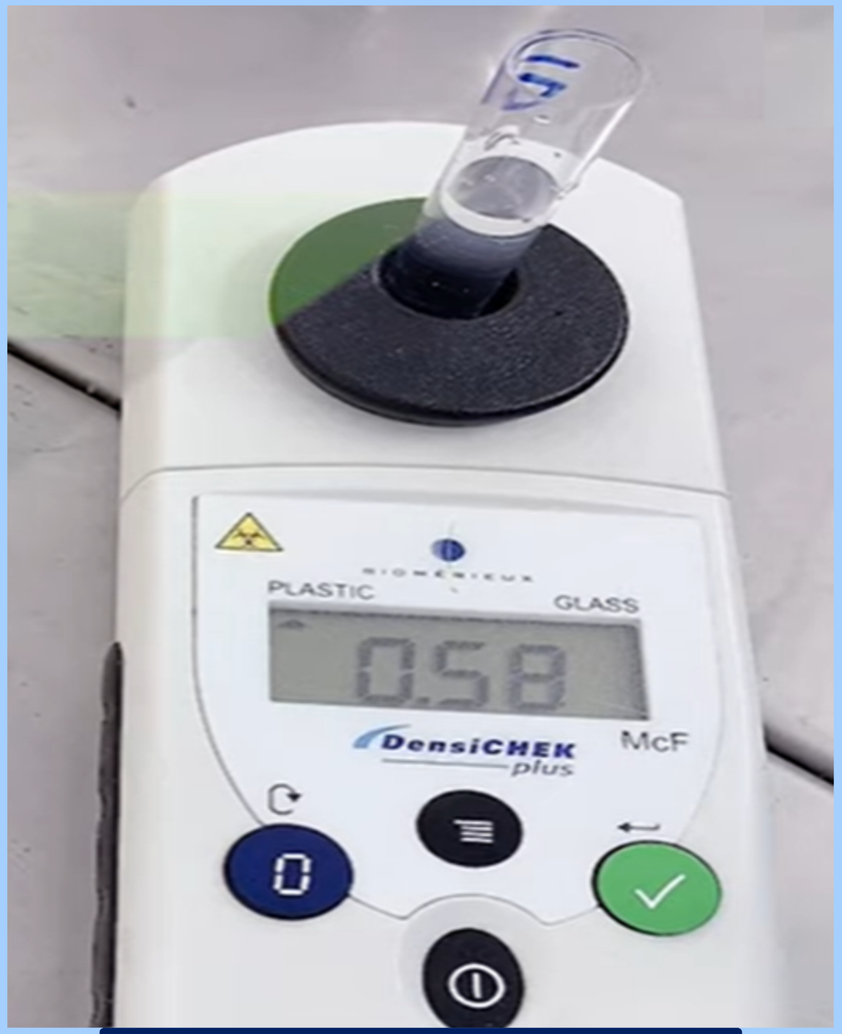
ID AST

Steps of work

3

Measure turbidity

(0.5 -0.63)

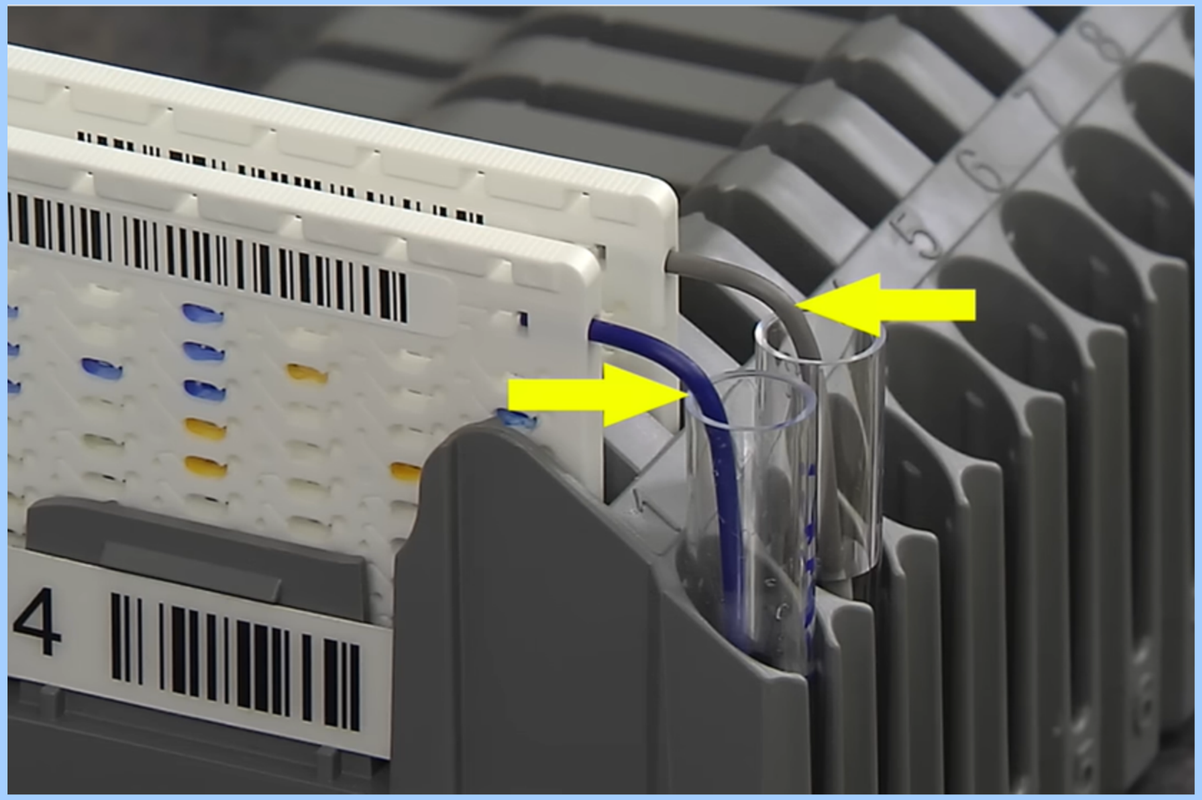


Turbidimeter

Steps of work

4

Insert cards in bacterial Suspension tubes

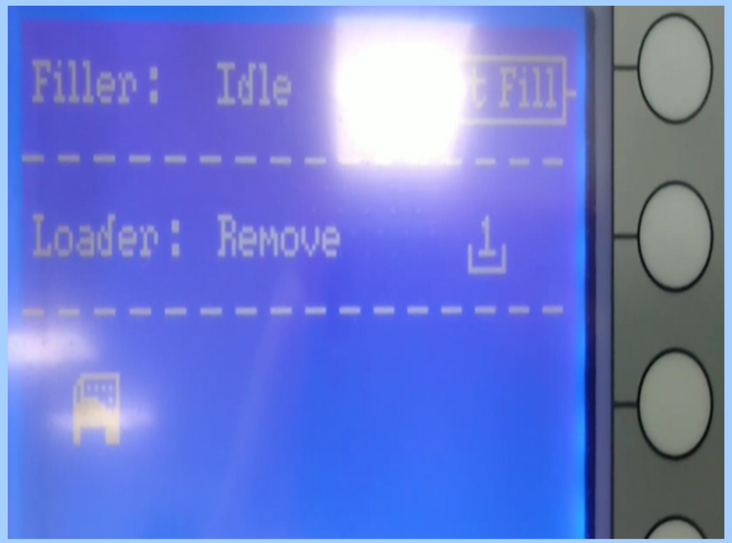


Steps of work

5

Into the filling room

(Transfer the bacterial suspension into the wells



Steps of work

6

Transfer the cassette into the loading room

(Diagnostic) 5-10hrs

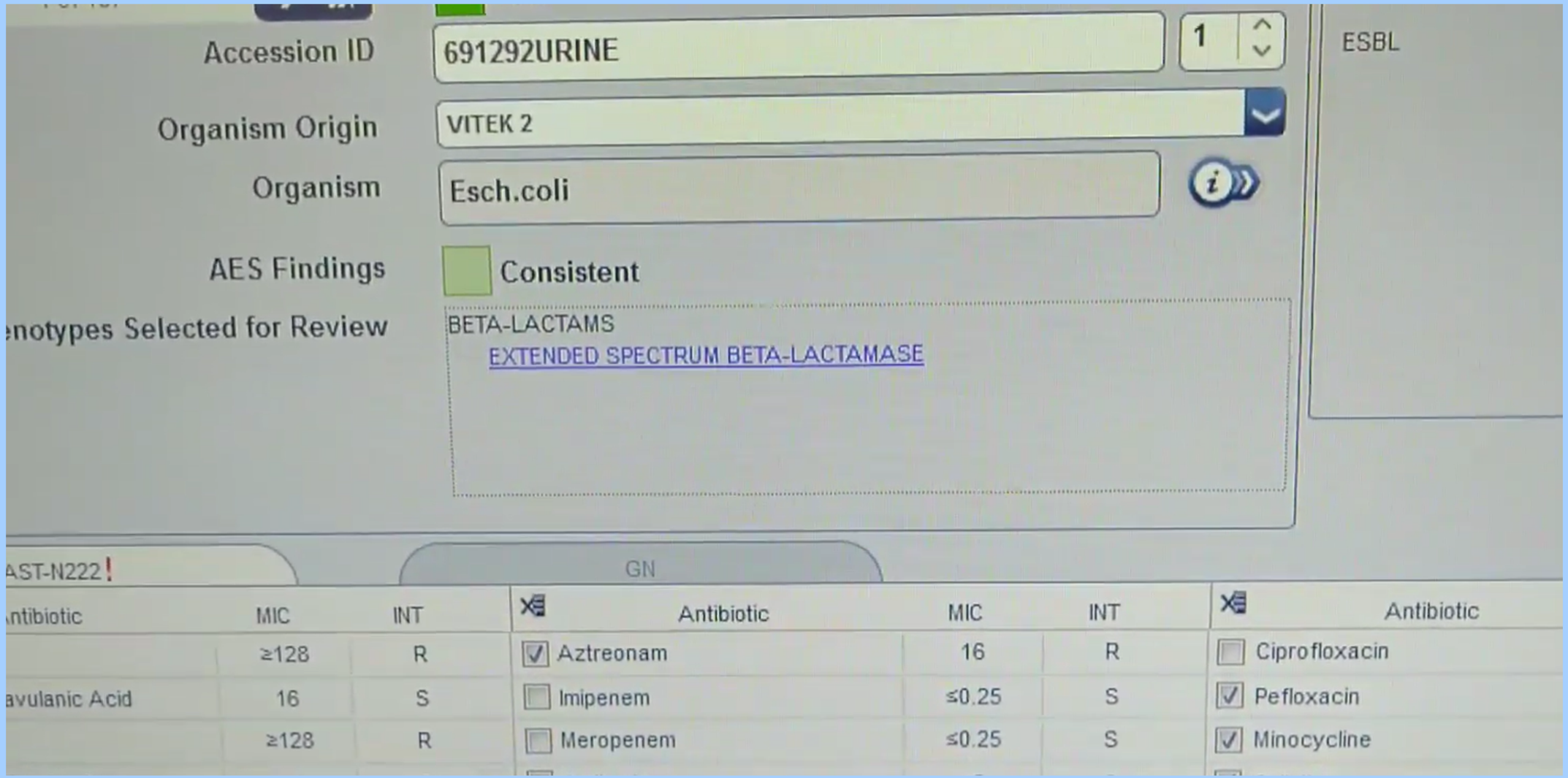
Steps of work

7

Colorimetric

(Barcode)

Steps of work



Urine culture technique

Purpose

Specimen

Method

Interpretation

Purpose

To diagnose

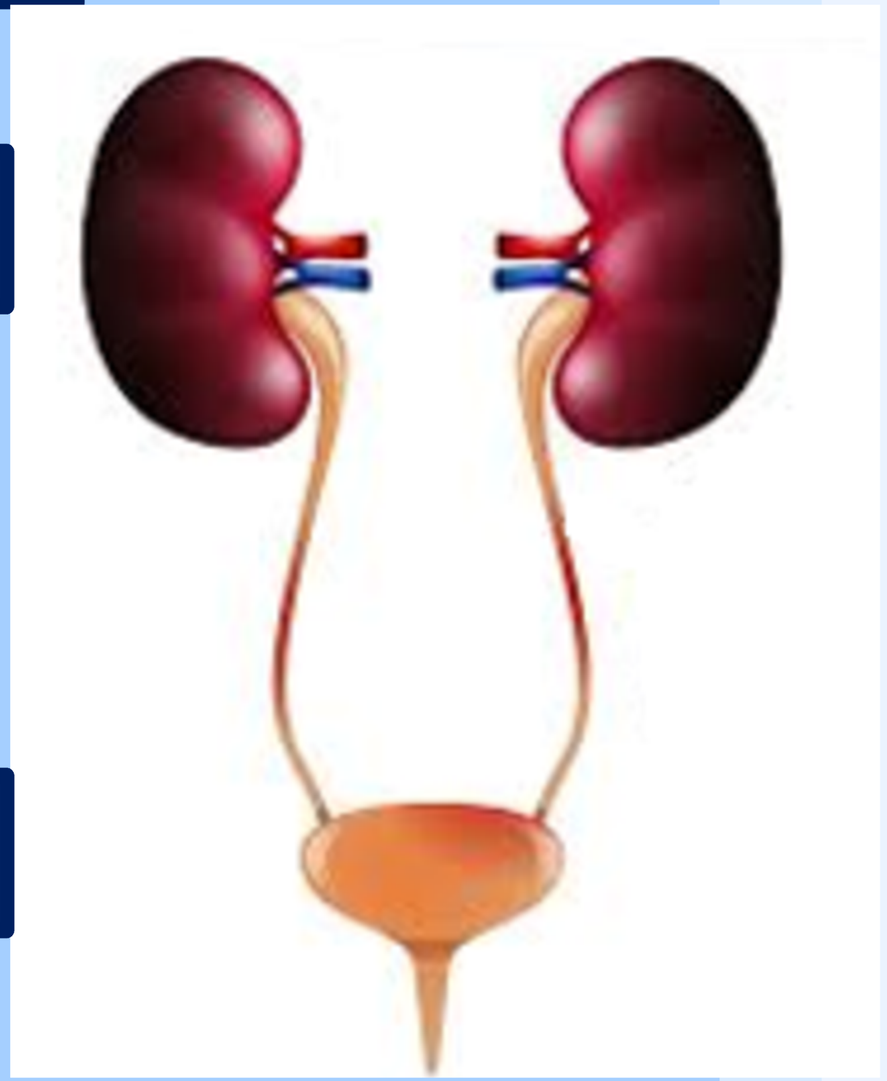
Urinary tract infection

(UTI)

(Bacteriuria)

Pyelonephritis

Cystitis



Purpose

UTI

Bacteriuria

Dysuria

Frequency

Purpose

UTI

↓

Bacteriuria

↓

Significant

$\geq 10^5$ CFU/ml

(100,000 CFU/ml)

Colony forming unit

(CFU)

Bacterial count

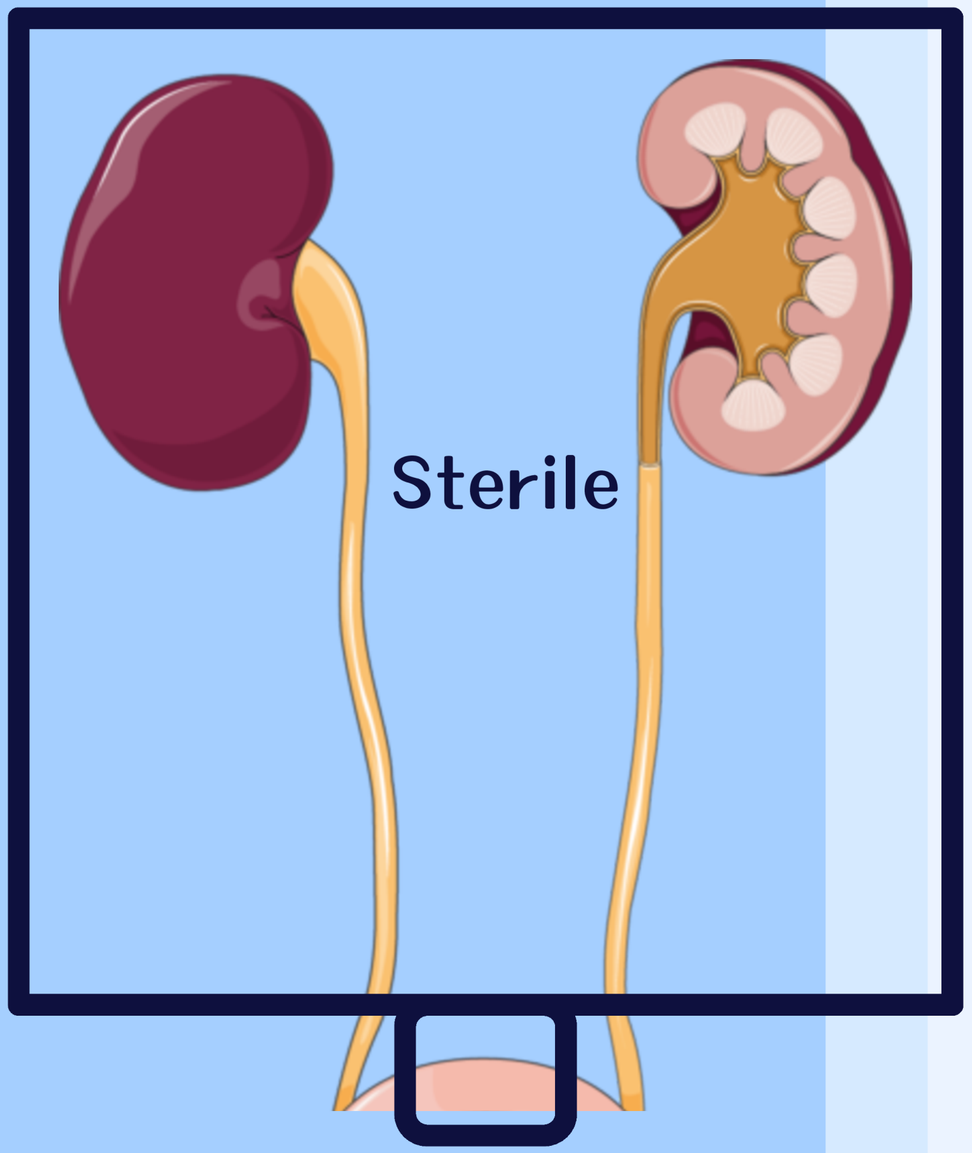
Purpose

Bacterial count

Bacteriuria

↓ ≥ 10^5 CFU/ml

Significant



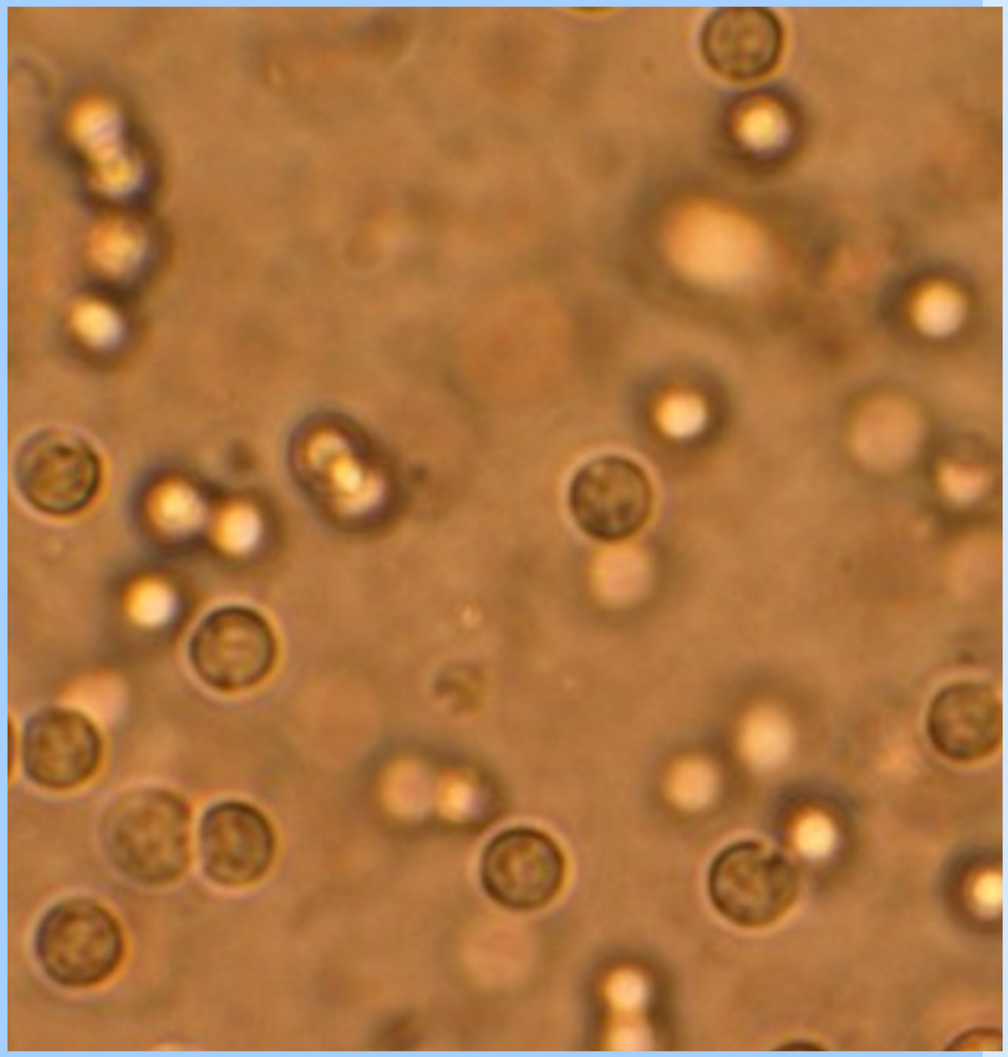
Purpose

Pyuria

(Pus in urine > 10 cells/HPF).

↓

Significant Bacteriuria



Specimen

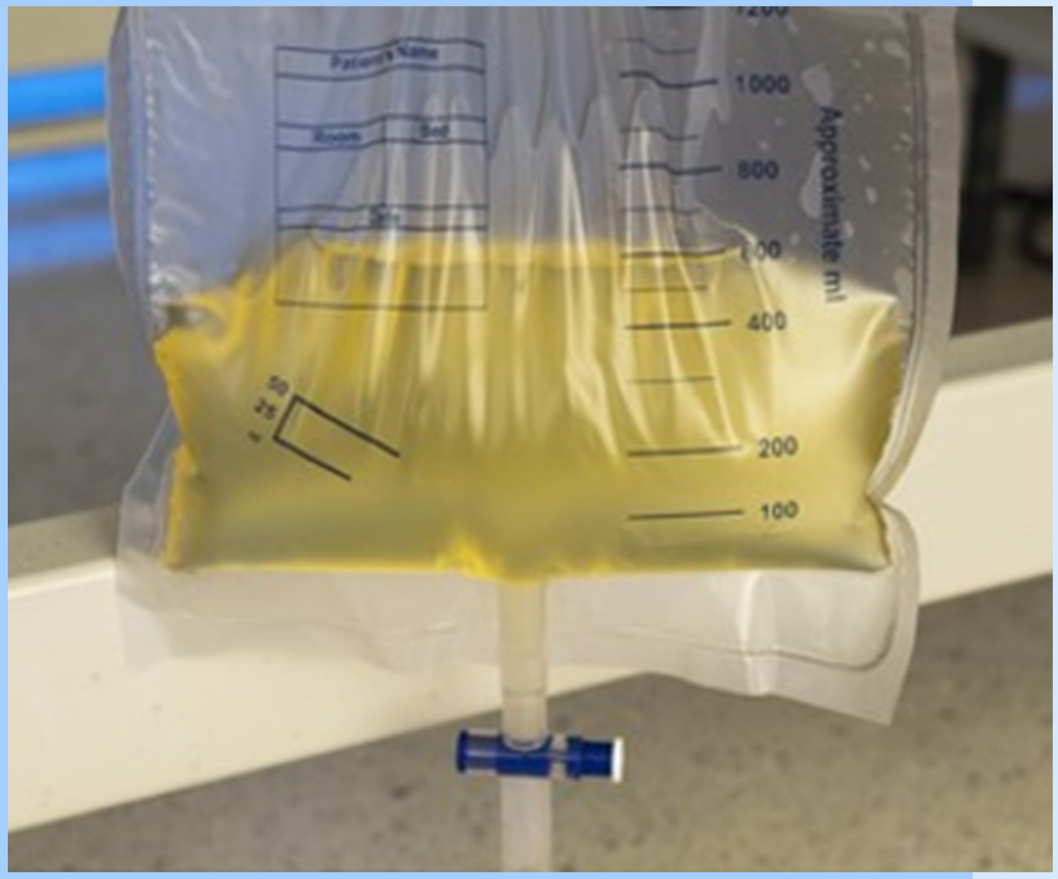
1

Mid stream urine

Specimen

2

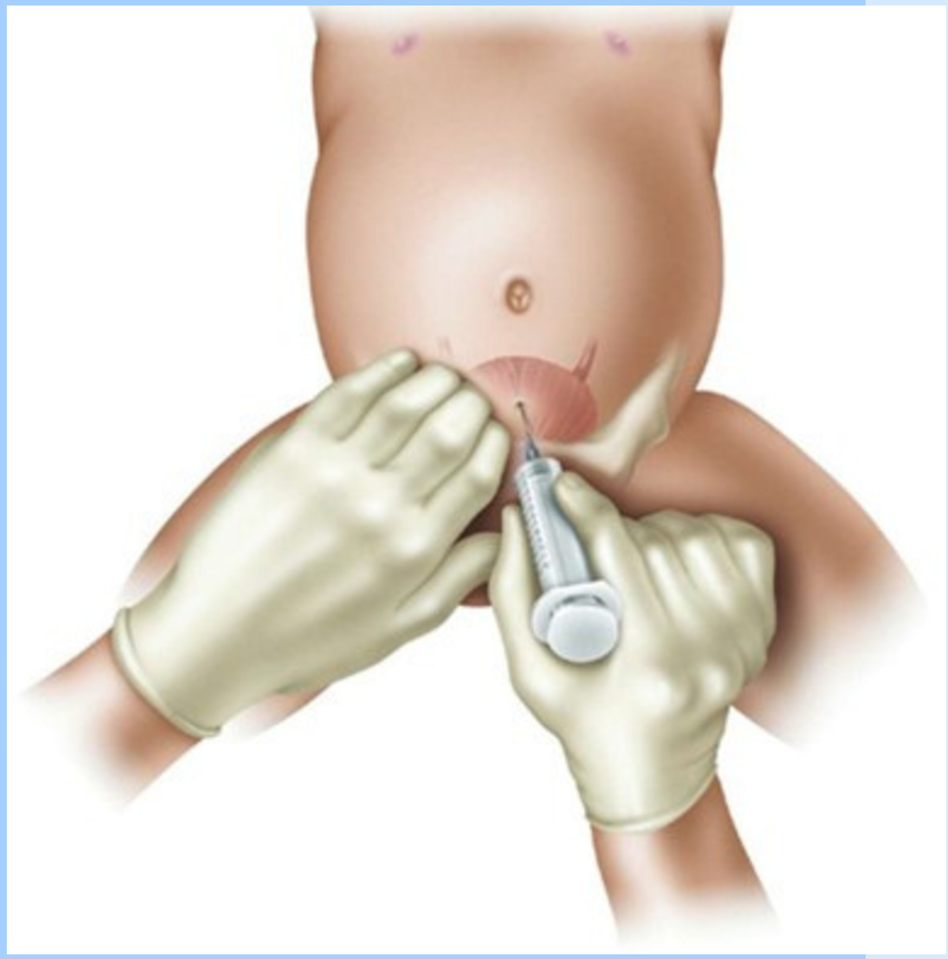
Catheterization



Specimen

3

Suprapubic aspiration



How to collect Mid stream urine

Stop antibiotics (for 3 days)

How to collect Mid stream urine

1. Wash and dry your hands.

2. Clean genital area

3. Remove the lid on the container (Sterile)

How to collect Mid stream urine

4 Pass a small amount of urine into the toilet.

(at morning)

5 Mid stream urine

6 Pass the reimaging urine

into the toilet.

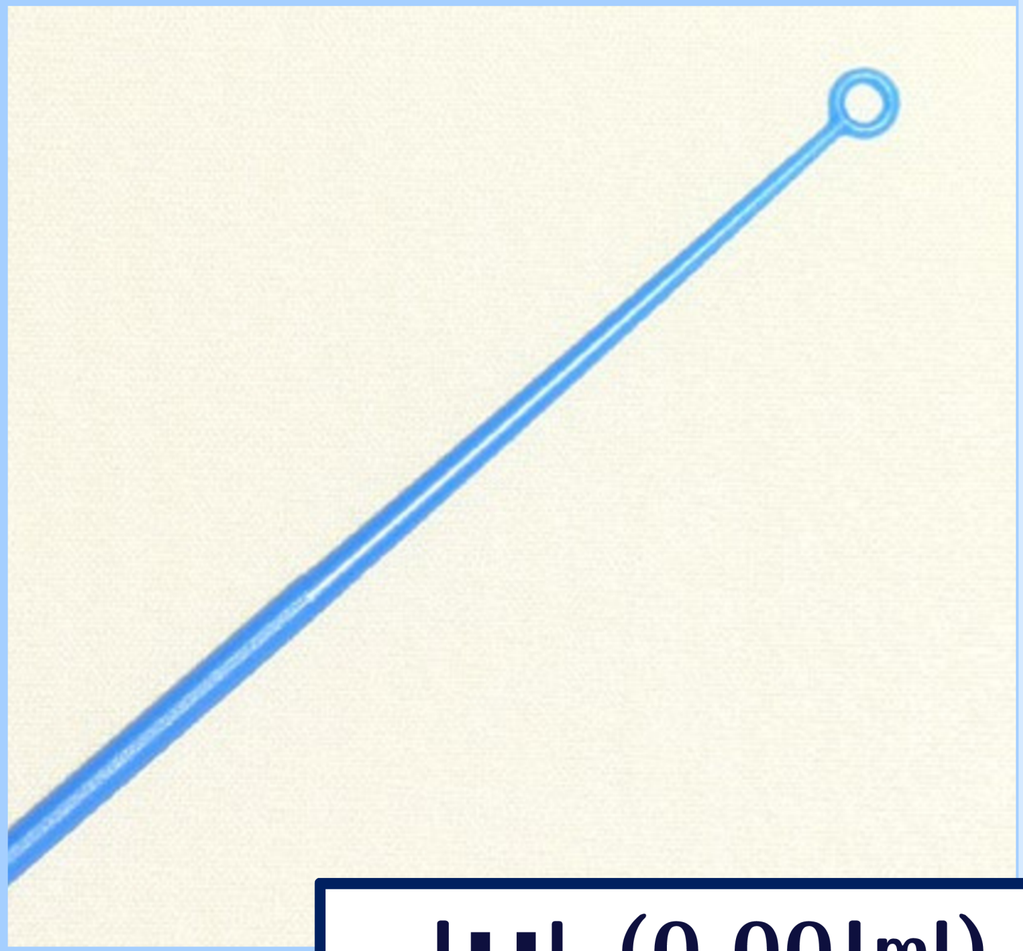
Mid stream urine

Method

1

Mix urine (uncentrifuged) & by

Calibrated loop



1µL (0.001ml)

10µL (0.01ml)

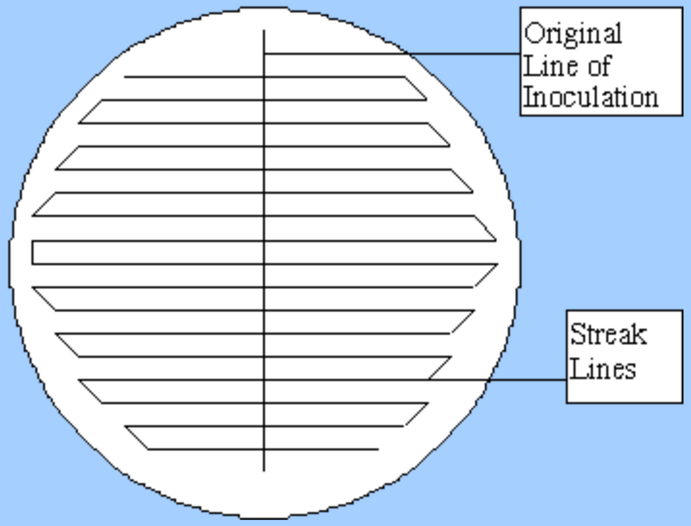
Method

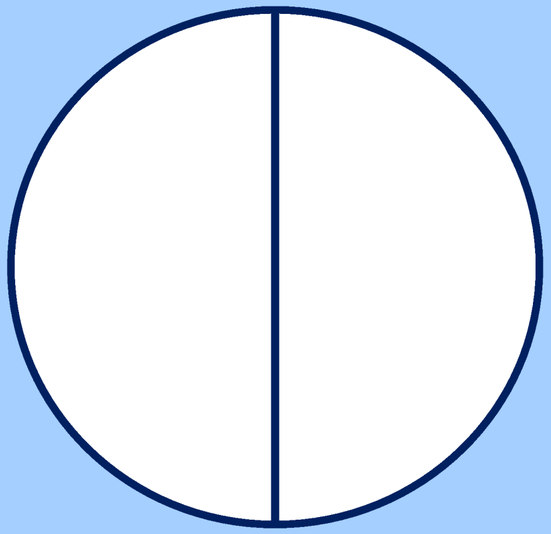
2

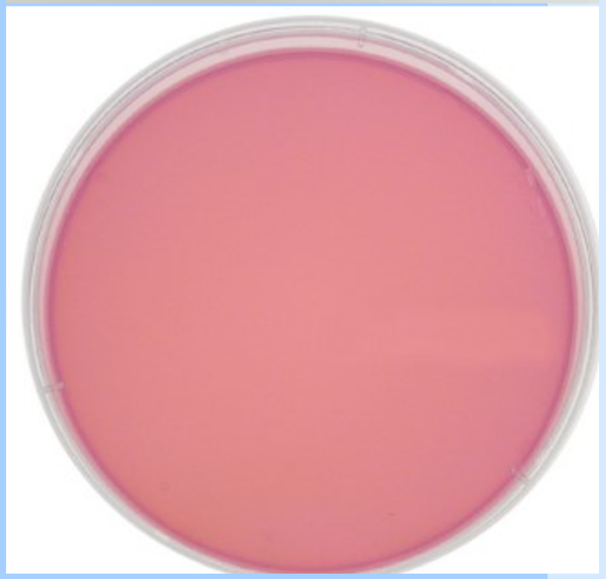
Inoculation on

By streaking & incubate at 37°C

For 24hrs.



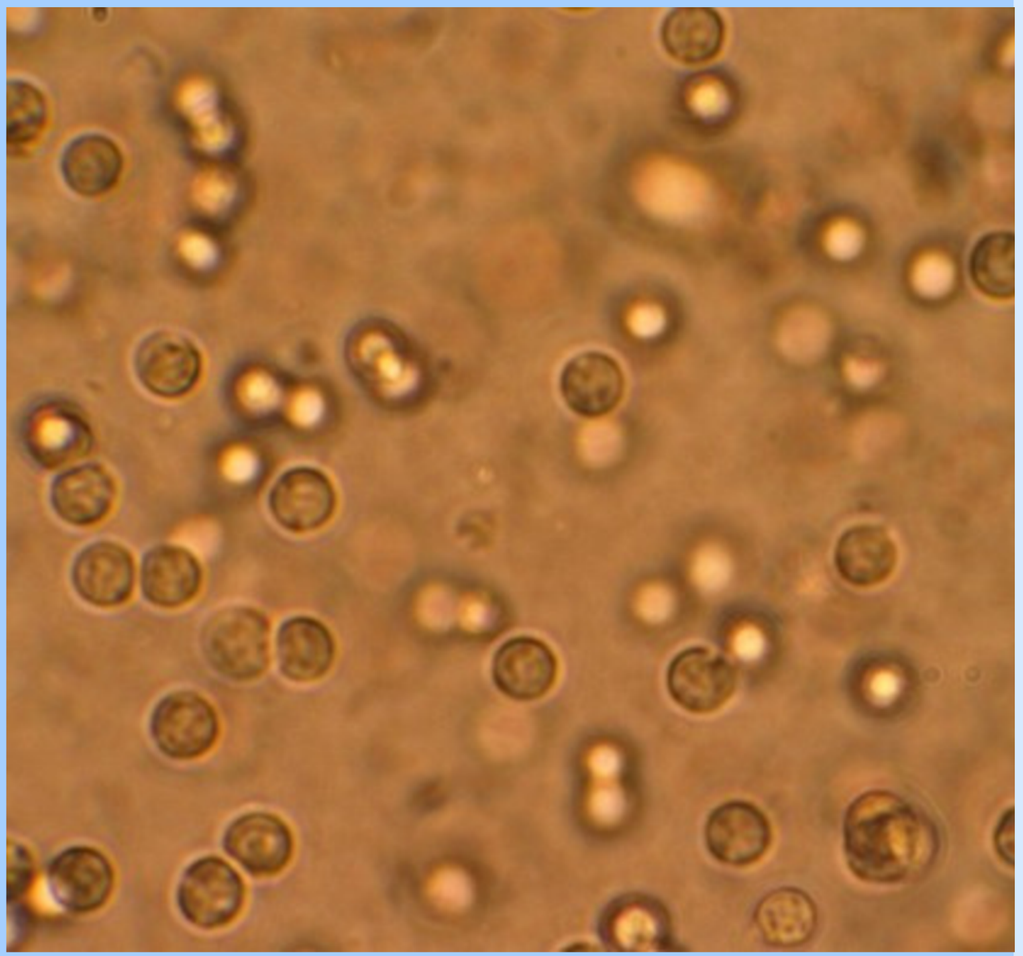




Method

3

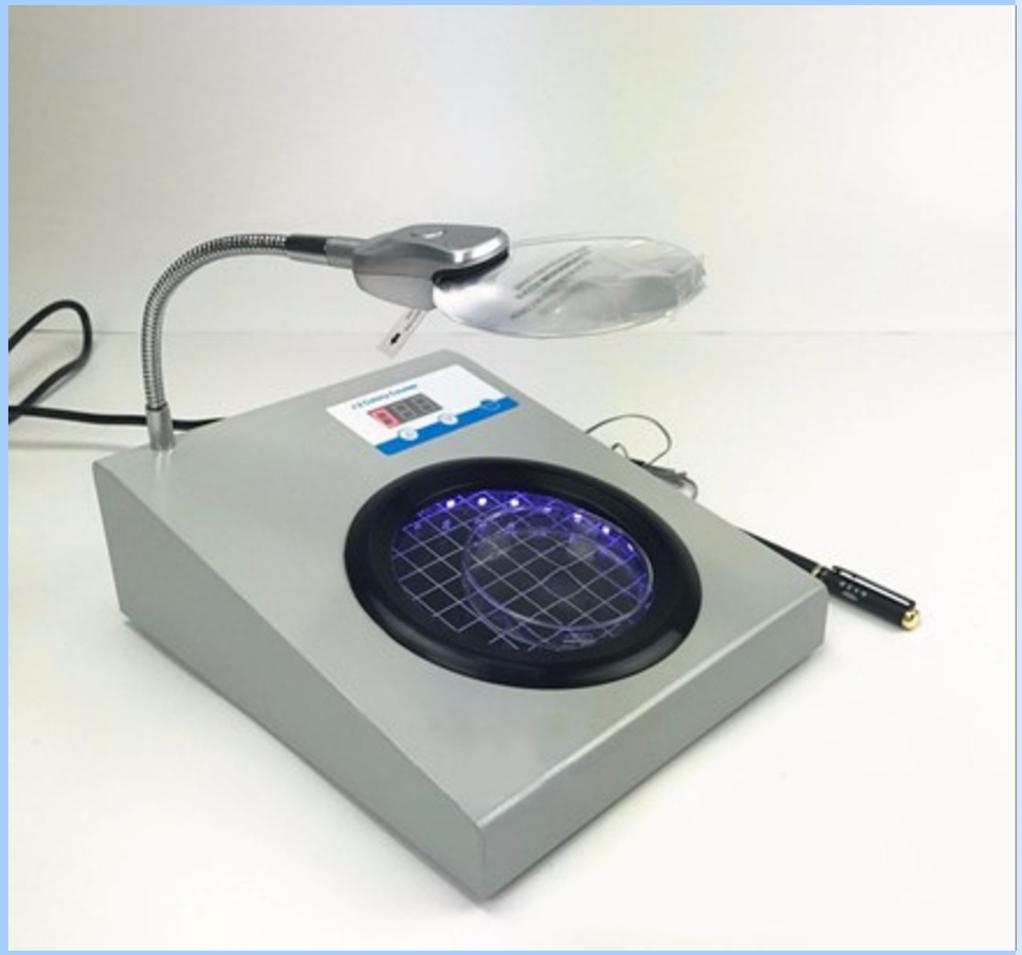
Examine centrifuged urine (≥ 10 cells/HPF) Pyuria



Method

4

Count the growth colonies



Method

10 µL(0.01ml)

No. of coloniesX100= 10^5 CFU/ml

1 µL (0.001ml)

No. of coloniesX1000= 105 CFU/ml

4

Multiply the count by dilution factor

Method

0.01ml (10 µL)	No. of coloniesX100= 10^5 CFU/ml

No. of colonies= 10

10X100= 1000 CFU/ml

10^3

Urine culture: Interpretation

$\geq 10^5$ CFU/ml

↓

Significant bacteriuria

↓

Identification

UTI

Interpretation

$\geq 10^4$ CFU/ml

10X1000= 10000 CFU/ml

Significant bacteriuria

Identification

S. aureus

Interpretation

$\geq 10^3$ CFU/ml

6X1000= 6000 CFU/ml

Significant bacteriuria

Identification

S. aureus

Interpretation

Sterile pyuria

Pus without any bacterial growth in ordinary media

Sterile pyuria

1

Taking antibiotics

Sterile pyuria

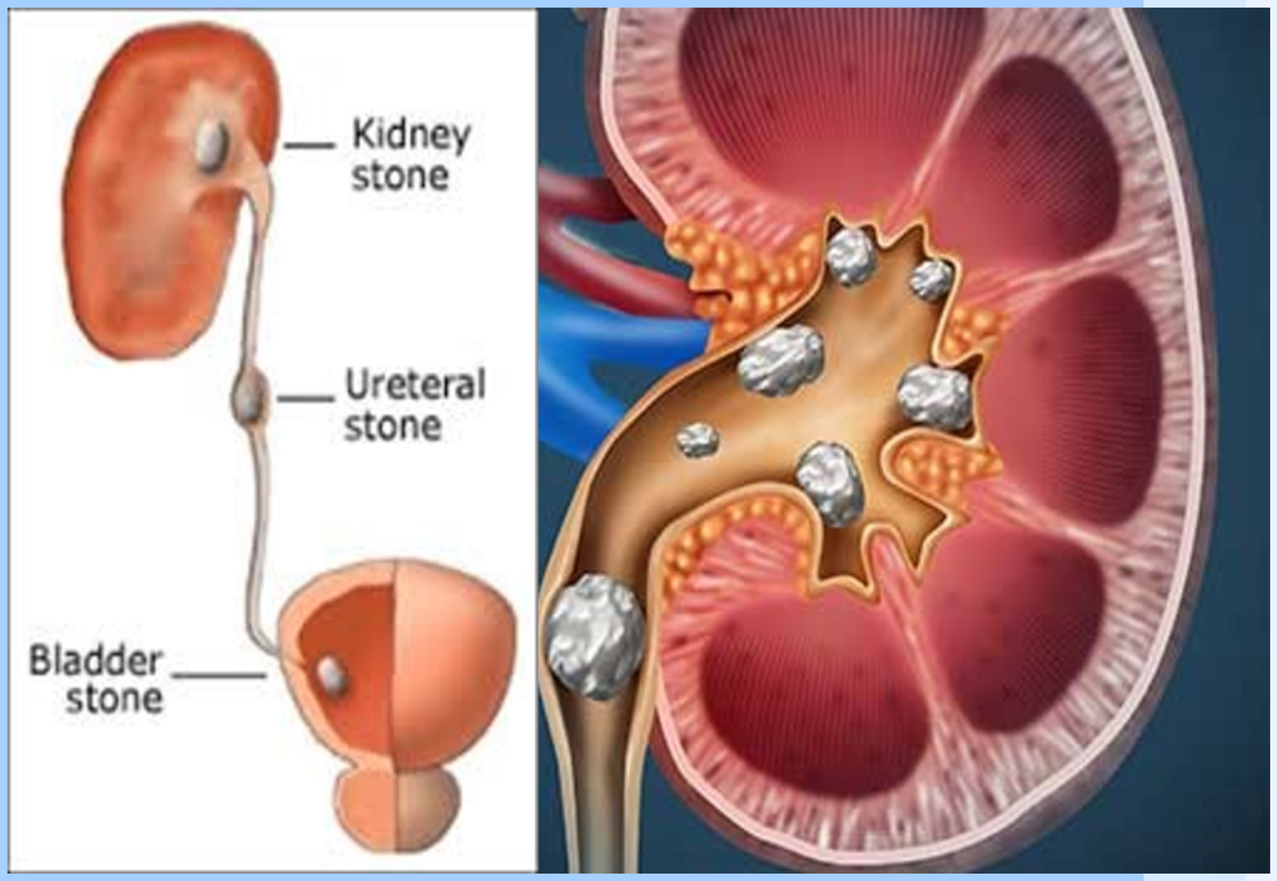
2

Renal tuberculosis

Sterile pyuria

3

Renal stones



Sterile pyuria

4

Organism not grow on ordinary media

Mycoplasma

L-form bacteria

Anaerobic infection

Interpretation

10^3

(No UTI)

Although there is pyuria

1) Prostatitis
2) Vaginitis
3) Cervicitis
4) Malignancy
5) Renal calculi

Interpretation

Suprapubic aspiration

10^3

Any growth is

significant bacteriuria

Interpretation

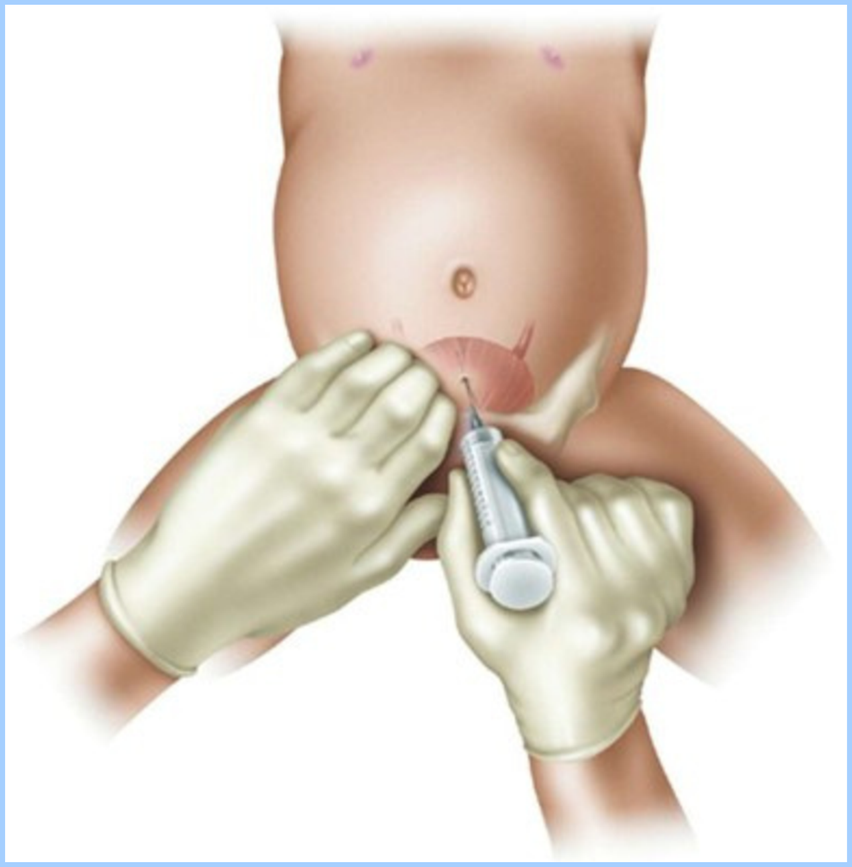
Suprapubic aspiration

10^3

1X1000= 1000 CFU/ml

Any growth is

significant bacteriuria



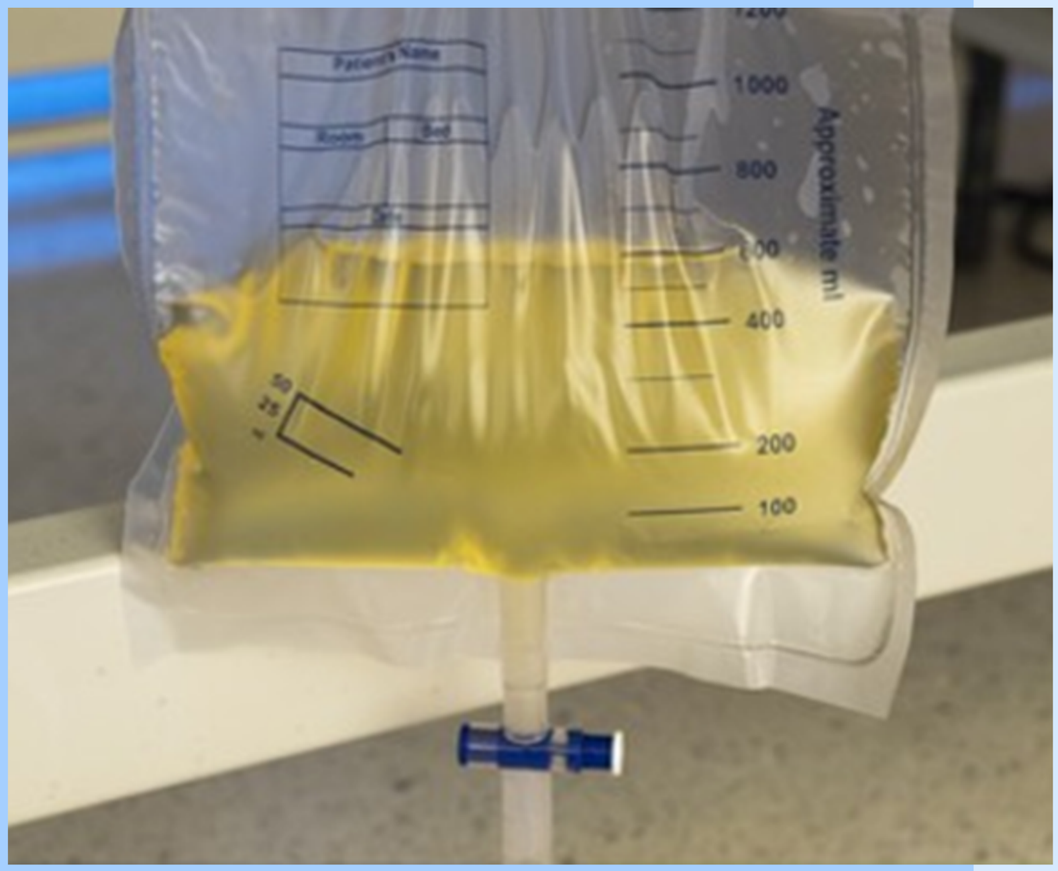
Interpretation

Catheterization

10^3

Any growth is

significant bacteriuria



Interpretation

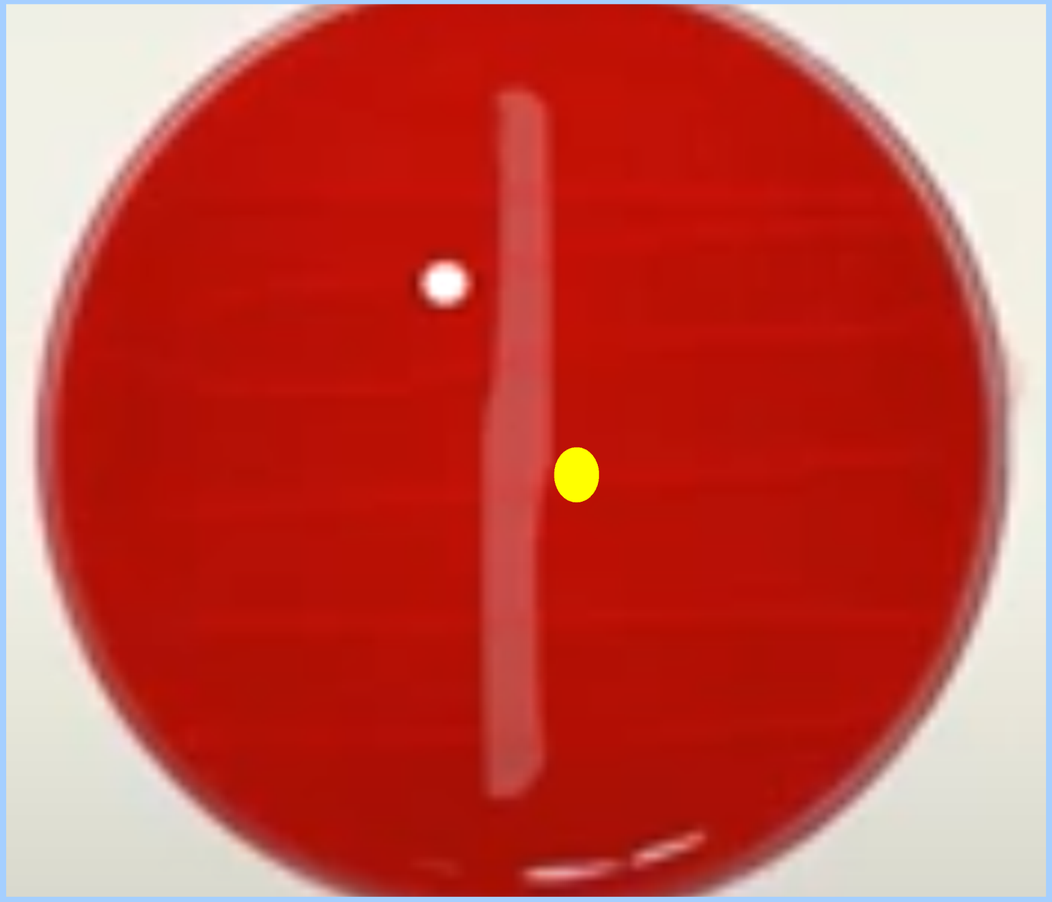
Catheterization

1X1000= 1000 CFU/ml

10^3

Any growth is

significant bacteriuria



Urine culture

Interpretation

Two pathogen

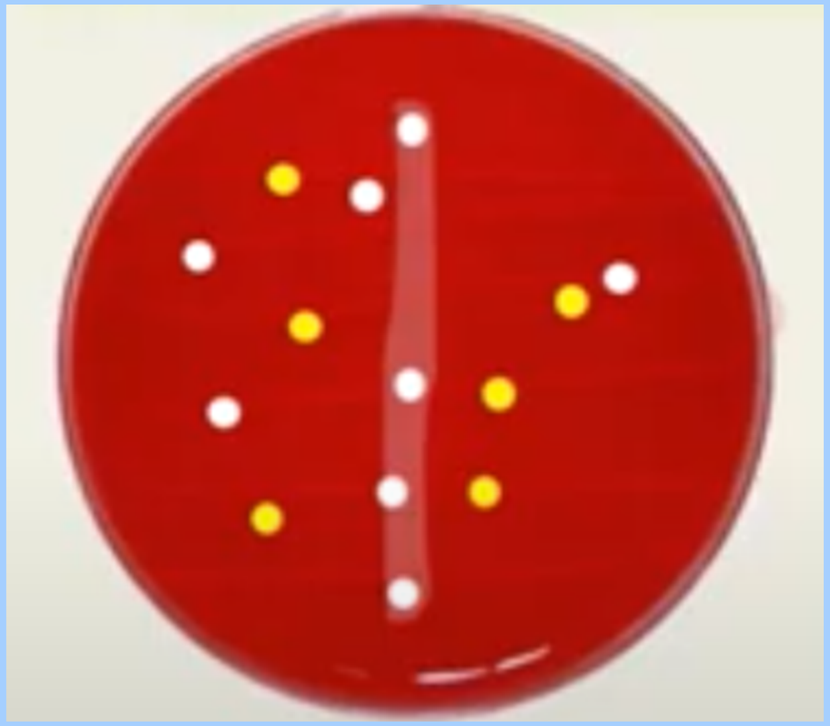
Interpretation

Count 1 ≤ 10^3 CFU/ml

- 8X1000= 8000 CFU/ml

Count 2 ≤ 10^3 CFU/ml

- 6X1000= 6000 CFU/ml



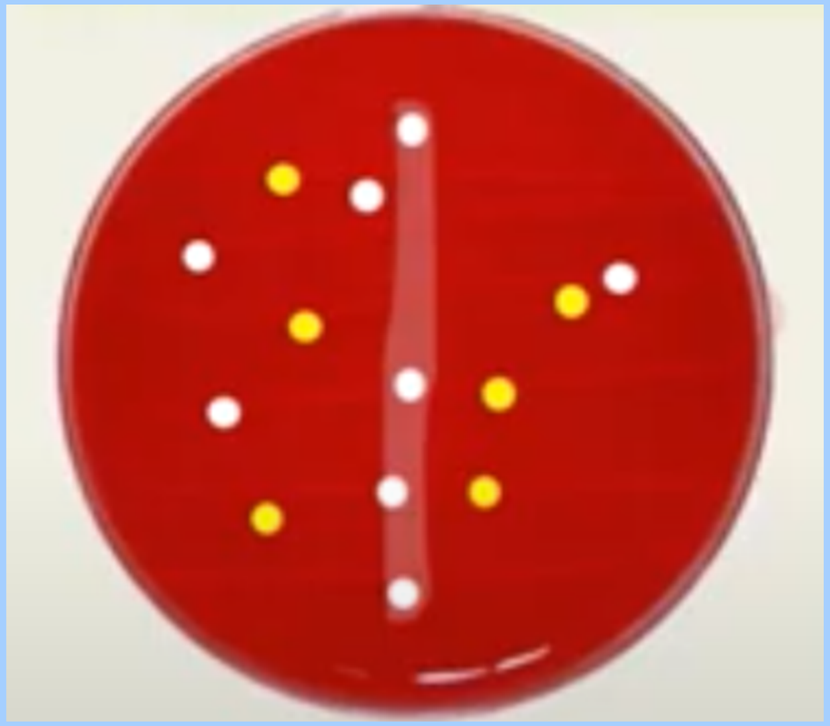
No significant growth

Interpretation

Count I $\geq 10^4$ CFU/ml

- 13X1000= 13000 CFU/ml
- 6X1000= 6000 CFU/ml

Continue with higher & ignore the other



Interpretation

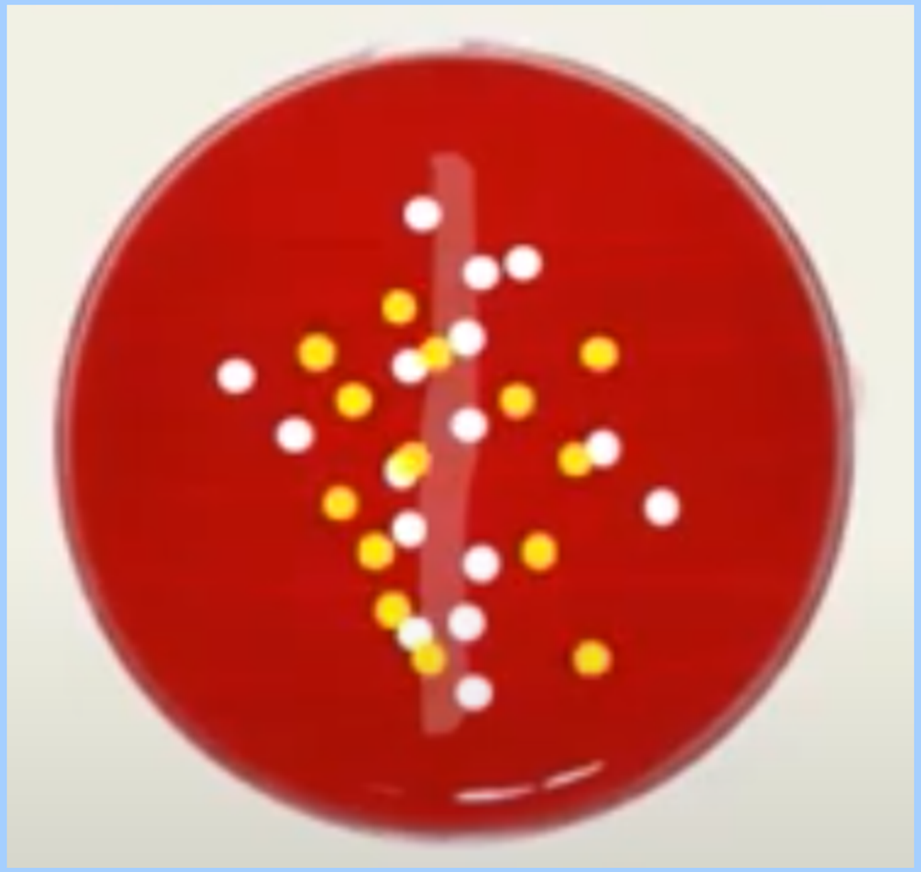
Count 1 ≥ 10^4 CFU/ml

- 16X1000= 16000 CFU/ml

Count 2 ≥ 10^4 CFU/ml

- 14X1000= 14000 CFU/ml

Identification for both



Blood culture

Purpose

Specimen

Method

Purpose

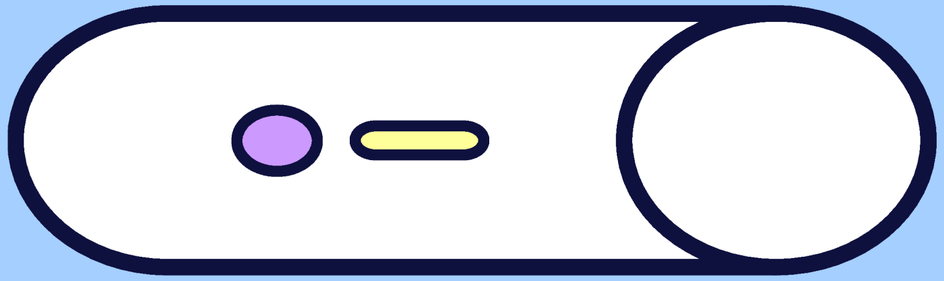
Bacteremic infections

Typhoid fever

Endocarditis

Puerperal sepsis

Brucellosis



Specimen

1

3ml blood to

30 ml broth

For child

Specimen

1

10 ml blood to

30 ml broth for Adult

(aerobic)

Specimen

1

10 ml blood to

40 ml broth for Adult

(anerobic)

Specimen

10 ml blood & 30 ml broth

Dilutes antibacterial

Provides good nutrient (organism present in small number)

Method

Incubation

5 to 21 days

Method

Organism present

⇩

Consume nutrients

⇩

CO_2 released

⇩

CO_2 reacts with sensor

⇩

Light appears

Method

Sub culture & incubate at

37°C for 24h .

⇩

Identification

⇩

Susceptibility test