Microbiology

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Bacterial taxonomy, Classification, and laboratory diagnosis

• Vitek system

➢ The vitek system is an automated tool used for:

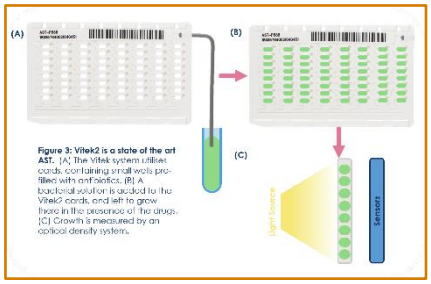
✓ *Identification, Antibiogram, Antifungals*

✓ **Include:**

- ***Vietk system***
- ***Two <u>cards</u> are :***

1. <u>Identification card (ID card)</u> have 47 biochemical tests
   - Specific Card for GN/ Specific Card for GP/ Specific Card for Yeast
2. <u>Antimicrobial susceptibility test card (AST card)</u> have :
   - 22 antibiotics and MIC

➢ Steps of work:



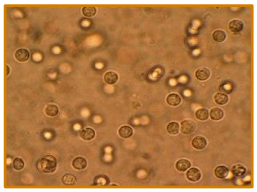
✓ Organism isolation (Pure)
✓ Bacterial suspension (2 tubes)
✓ Measure turbidity (0.5 -0.63)
✓ Insert cards in bacterial Suspension tubes
✓ Into the filling room (Transfer the bacterial suspension into the wells
✓ Transfer the cassette into the loading room (Diagnostic) 5-10hrs
✓ Colorimetric (Barcode)

• Urine culture technique

➢ ***Purpose***

✓ *To diagnose*: urinary tract infection (UTI) → bacteriuria
✓ Symptoms to UTI: Dysuria frequency
✓ Bacteriuria *significant* when:

- Bacterial count: 100,000 CFU/ml (colony forming unit [CFU])



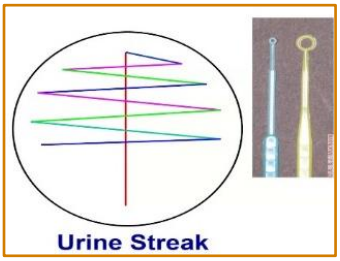
- In Pyuria :(Pus in urine > 10 cells/HPF) Significant Bacteriuria

➢ ***Specimen:***

✓ Mid-stream urine
✓ Catheterization
✓ Suprapubic aspiration

- How to collect Mid-stream urine?
  - Stop antibiotics (for 3 days)
  - Wash and dry your hands.
    1. Clean genital area
    2. Remove the lid on the container (Sterile)
    3. Pass a small amount ofurine into the toilet. (at morning)
    4. Mid stream urine
    5. Pass the reimaging urine into the toilet.

➢ ***Method***



- ✓ Mix urine (uncentrifuged) & by Calibrated loop
- ✓ Inoculation on by streaking & incubate at 37ºC For 24hrs.
- ✓ Examine centrifuged urine (≥ 10 cells/HPF) Pyuria
- ✓ Count the growth colonies
- ✓ Multiply the count by dilution factor
  10µL(0.01ml) → No. of coloniesX100= 10^5 CFU/ml
  1µL (0.001ml) → No. of coloniesX1000= 10^5 CFU/ml

➢ ***Interpretation***

- ✓ *≤10^5 CFU/ml* → Significant bacteriuria → Identification
- ✓ *≤10^3 CFU/ml + **S. aureus*** → Significant bacteriuria → Identification
- ✓ *Sterile pyuria* Pus without any bacterial growth in ordinary media[10^3 (No UTI)] → Sterile pyuria:

Causes:

- Taking antibiotics
- Renal tuberculosis
- Renal stones
- Organism not grow on ordinary media
  - Mycoplasma
  - L-form bacteria
  - Anaerobic infection
- Prostatitis
- Vaginitis
- Cervicitis
- Malignancy
- Renal calculi

- ✓ *Suprapubic aspiration* →10^3 → Any growth is significant bacteriuria

• Blood culture

➢ ***Purpose***

- ✓ *Bacteremic infections*
  - Typhoid fever
  - Endocarditis
  - Puerperal sepsis
  - Brucellosis

➢ ***Specimen***

- ✓ 3ml blood to 30 ml broth For child
- ✓ 10 ml blood to 30 ml broth for Adult (aerobic)
- ✓ 10 ml blood to 40 ml broth for Adult (anerobic)

➢ ***Method***

- ✓ 10 ml blood & 30 ml in *broth Dilutes antibacterial* that provides good nutrient (organism present in small number)
- ✓ Incubation 5 to 21 days
- ✓ Organism present → Consume nutrients→ CO2 released→ CO2 reacts with sensor→ Light appear
- ✓ Sub culture & incubate at 37º C for 24h →Identification→ Susceptibility test

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