

INTERNSHIP REPORT

Submitted to

SATHYABAMA INSTITUTE OF SCIENCE AND TECHNOLOGY

in partial fulfillment of The Award of The Degree Of

BACHELOR OF SCIENCE

In

MEDICAL LABORATORY TECHNOLOGY

By

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DEPARTMENT OF MEDICAL LABORATORY TECHNOLOGY

SCHOOL OF ALLIED HEALTH SCIENCES

SATHYABAMA

INSTITUTE OF SCIENCE AND TECHNOLOGY

(DEEMED TO BE UNIVERSITY) Accredited with Grade “A++” by NAAC | 128 status

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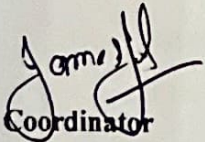
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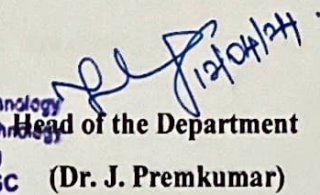
BONAFIDE CERTIFICATE

This is to certify that this internship report is the bonafide work of **PRIYANKA KUMARI** who have done the project work as a team and carried out the training program at **SATHYABAMA GENERAL HOSPITAL** under our supervision from August 2023 to April 2024.

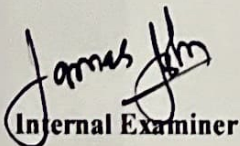

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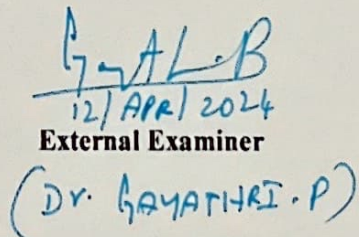
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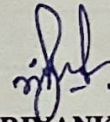

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DECLARATION

I, **PRIYANKA KUMARI (41737013)**, hereby declare that the internship trainings done by me at **LIONS BLOOD BANK AND RESEARCH FOUNDATION at Ambattur** under the guidance of **Ms. D. JASMINE PRIYA** and **SATHYABAMA GENERAL HOSPITAL at Semmencheri** under the guidance of **Dr. JAMES JOHN** at Sathyabama Institute of Science and Technology is submitted in partial fulfillment of the requirements for the award of Bachelor of science degree in **MEDICAL LABORATORY TECHNOLOGY**.

DATE: 12 APRIL, 2024

PLACE: CHENNAI



(Ms. PRIYANKA KUMARI)

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DATE:

PLACE: CHENNAI

(Ms. PRIYANKA KUMARI)

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INTRODUCTION

I got the opportunity to attend a one-month internship at Sathyabama General Hospital. I got the opportunity to learn about several facets of laboratory sciences during my internship, including microbiology, hematology, biochemistry, automation, and workshops. I also gained theoretical understanding and practical experience in these areas. This internship helped me gain useful skills and deepened my understanding of the critical role laboratory techniques play in assisting with medical diagnosis and treatment.

When it comes to microbiology, I learned about preparing various media, such as Nutrient Agar, TSI-A, Citrate, MacConkey Agar, Salmonella-Shigella Agar, and XLD-Agar. I also improved my streaking, autoclave handling, biochemical test-taking, slant media preparation, slant media streaking, antibiotic sensitivity testing, and microscopic viewing techniques.

During my internship, I also had the chance to learn about hematological processes like preparing blood smears, counting cells, categorizing blood, and utilizing kits to screen for malaria and Widal.

I studied both general and patient-specific urine analysis methods in the field of biochemistry, which greatly advanced my comprehension of diagnostic processes.

Through hands-on experiences, I gained proficiency in various automation techniques such as SDS PAGE, DNA extraction, Dot ELISA, and Sandwich ELISA, which are integral to modern laboratory practices.

Participation in workshops further enriched my skills, particularly in urinalysis, spectrometer-based testing for albumin, protein, and cholesterol, and observation of automation machines in action.

MICROBIOLOGY

MEDIA PREPARATION

TYPES OF MEDIA PREPARED
MacConkey Agar
Simmon Citrate Agar
TSI- Agar (I)
MR-VP Medium
Lactose Broth
Nutrient Agar
EMB Agar
Agar Agar Type I
XLD- Agar
Blood Agar base
SS Agar

NUTRIENT AGAR

Preparation

- Suspend 28 g of nutrient agar powder in 1 litre of distilled water.
- Heat this mixture while stirring to fully dissolve all components.
- Autoclave the dissolved mixture at 121 degrees Celsius for 15 minutes.
- Once the nutrient agar has been autoclaved, allow it to cool but not solidify.
- Pour nutrient agar into each plate and leave plates on the sterile surface until the agar has solidified.
- Replace the lid of each Petri dish and store the plates in a refrigerator.
- **NOTE:** Depending on the type, store the media in a refrigerator or at room temperature according to the manufacturer's instructions.

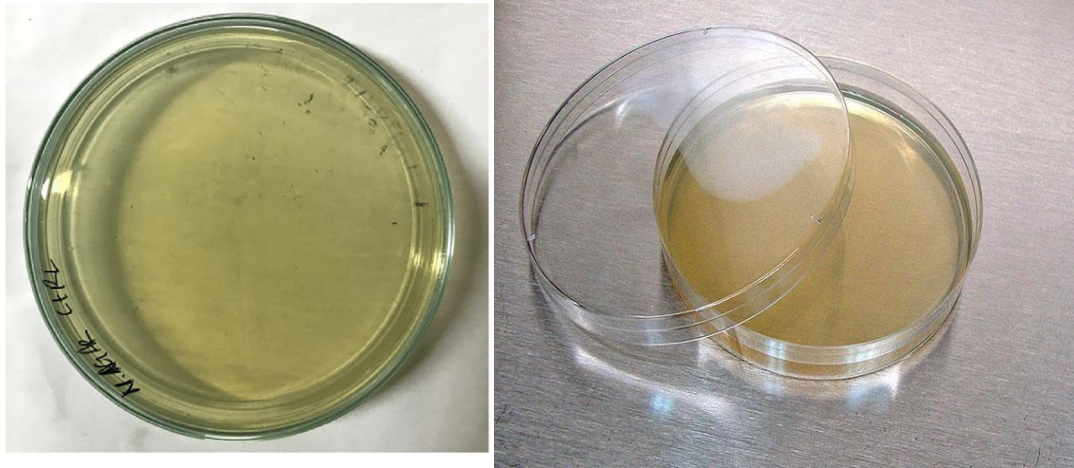


Figure 1: Nutrient Agar

TSI-A: TRIPLE SUGAR IRON-AGAR

Preparation

- Suspend 64.42 grams (the equivalent weight of dehydrated medium per liter) in 1000 ml purified distilled water.
- Heat to boiling to dissolve the medium completely.
- Mix well and distribute into test tubes.
- Sterilize by maintaining at 10lbs pressure (115°C) for 30 minutes or as per validated cycle.
- Allow the medium to set in the sloped form with a butt about 2.5cm long.
- With a straight inoculation needle, touch the top of a well-isolated colony.
- Inoculate TSI by first stabbing through the center of the medium to the bottom of the tube and then streaking the surface of the agar slant.
- Leave the cap on loosely and incubate the tube at 35°-37°C in ambient air for 18 to 24 hours.
- Examine the reaction of the medium.



Figure 2: TSI-A

CITRATE

Preparation

- Get dehydrated citrate powder, water, a container, measuring tools, an autoclave with safety gear, and test tubes or Petri dishes (with or without cotton balls).
- Aseptically measure the exact amount of powder following the recommended concentration (grams per liter of water).
- Add the powder to water in a flask, disperse, and stir with a sterile rod until completely dissolved. Warm slightly if needed.
- Aseptically transfer the prepared media into chosen containers:
- For Petri dishes, fill them about halfway.
- For test tubes, fill them one-third full.
- Some Citrate Agar formulations might require adjusting the pH to slightly acidic using sterile citric acid solution (monitored by a pH meter) if instructed by the media information.
- Autoclave the containers for a set time and pressure (typically 15-20 minutes at high temperature and pressure) to eliminate contaminants.
- Let the autoclaved media cool to a safe handling temperature. The media will solidify as a gel in dishes or a slant in tubes (depending on your choice in step 4).
- Keep the Citrate Agar plates or tubes in a cool, dark place until needed. Refrigeration is preferred for longer storage based on manufacturer's recommendations.



Figure 3: Citrate

MAC-CONKEY AGAR

Preparation

- Get dehydrated MacConkey powder, water, container, measuring tools, autoclave with safety gear, test tubes (with cotton balls optional), and petri dishes.
- Measure the powder aseptically following recommended concentration (grams per liter). Dissolve it in water using a sterile stir bar and slight heat if needed.
- Aseptically transfer the prepared media into petri dishes, filling them halfway without overflowing.
- Close the dishes and let them cool on a level surface. The media will solidify into a flat agar surface within 15-30 minutes.
- Once solid, mark the petri dishes with date, media type, and experiment details using a permanent marker.
- Use the plates immediately or store them in a refrigerator for up to a week. For longer storage, follow specific instructions for freezing and thawing cycles.

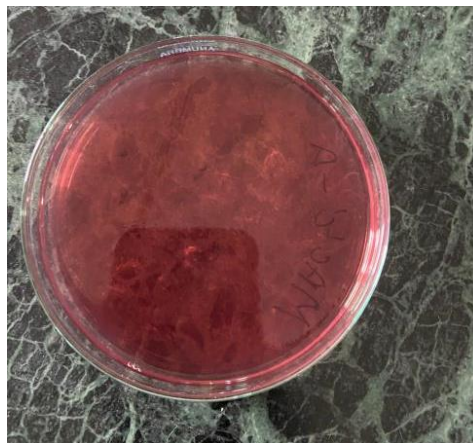


Figure 4: MacConkey Agar

SALMONELLA –SHIGELLA AGAR

Preparation

- Following the specific media instructions, measure the SS Agar powder aseptically (using sterile technique).
- Add the powder to water in a flask, disperse, and stir with a magnetic stirrer or sterile rod until completely dissolved. Avoid overheating, as it can harm the media.

- Some instructions might require briefly boiling the media while stirring for better dissolving. Follow the specific instructions for your SS Agar.
- After dissolving, take the media off the heat and let it cool to a safe handling temperature (around 45-50°C). Don't let it cool too much.
- Aseptically pour the media into petri dishes, filling them halfway without overflowing.
- Let the plates cool on a level surface. The media will solidify into a reddish-orange colored gel.
- Briefly leave the lids slightly ajar to remove excess moisture and prevent condensation on the agar surface.
- Once solidified, label the plates with date, media type, and experiment details using a permanent marker.
- Store the SS Agar plates in a refrigerator for several weeks until needed.
- **Note:**
- SS Agar is a selective and differential media. Do not autoclave the media, as this can damage the selective agents.

XLD-AGAR

Preparation

- Suspend 56.68 grams in 1000 ml distilled water.
- Heat with frequent agitation until the medium boils.
- ***DO NOT AUTOCLAVE OR OVERHEAT.***
- Transfer immediately to a water bath at 50°C.
- After cooling, pour into sterile Petri plates.
- It is advisable not to prepare large volumes that will require prolonged heating, thereby producing precipitate, thereby producing precipitate

EXTRA THINGS I HAVE LEARNT

- A proper amount of agar gel in petri-dish helps to set fast because it provides a good base.
- While pouring a sample into the tube make sure to touch the tube wall.
- Bubbles should not be there in the tube.
- Make sure to heat it after autoclave to mix it properly because all the particles are deposited at the bottom.

- Avoid placing media flasks directly on the benchtop. Use test tube racks or beakers to minimize contamination.
- Discard all used materials and waste appropriately according to your lab's safety protocols.
- Clearly label your prepared media with relevant information like date, media type, and experiment details for better organization and tracking.

STREAKING

“Streaking” is the name of a method for separating pure cultures of bacteria from a mixture of populations. Using a sterile inoculating loop or streak plate approach, a tiny sample of the mixed culture is transferred onto a new agar plate.

Materials required

- A source of bacteria (stock culture, previously streaked agar plate, or any other inoculum)
- Inoculation tube
- A striker/lighter
- Bunsen burner
- Lysol (10%v/v)
- Agar plate
- Paper towels

Procedure

- Ensure that your work area is clean and sterilized. Disinfect the benchtop with appropriate agents like ethanol or bleach.
- Label the agar plates with the appropriate information, such as date, sample source, and any other necessary details. Allow the plates to cool and solidify if they have been recently autoclaved.
- Sterilize the inoculating loop by heating it in the flame of a Bunsen burner or alcohol lamp until it becomes red-hot. Allow it to cool for a few seconds.

- Open the lid of the agar plate and using the sterilized loop, pick up a small amount of the bacterial culture. Be careful not to touch the loop to any surface other than the agar plate.
- Lift the lid of the agar plate slightly and streak the bacterial culture onto the surface of the agar in a zigzag pattern, concentrating on one section of the plate. Ensure that the streaking pattern covers only a small portion of the agar surface.
- Sterilize the inoculating loop again by passing it through the flame. Allow it to cool.
- Rotate the agar plate about 90 degrees. This step ensures that any excess bacteria on the loop are spread thinly across the surface of the agar.
- Using the sterilized loop, streak the plate again starting from the area where the previous streak ended and extending it into a new area of the plate.
- Repeat steps 6-8 at least two more times or until the entire surface of the agar plate has been streaked. Each streaking should cover a smaller area than the previous one.
- Close the lid of the agar plate and seal it with tape if necessary.
- Incubate the agar plate upside down at the appropriate temperature and conditions suitable for the growth of the bacteria being cultured.
- Check the plate periodically for the appearance of bacterial colonies. Colonies should be visible within 24-48 hours, depending on the bacterial species and incubation conditions.

BIOCHEMICAL TESTS

- Biochemical tests are one of the traditional methods for the identification of microorganisms, usually performed with phenotypic identification.
- The ability of microorganisms to utilize certain biomolecules, resulting in useful organic compounds for themselves forms the basis of various biochemical tests.
- Biochemical tests are of different types, where the identification or distinction between different microorganisms is made on various bases.

TYPES OF BIOCHEMICAL TESTS:

- Catalase Test
- Oxidase Test

- Indole Test
- Methyl Red
- Voges-Proskauer
- Citrate
- Triple Sugar Iron(TSI)
- Urease
- Mannitol Mortility

AUTOCLAVE

Procedure:

- Place the material to be sterilized inside the pressure chamber and fill the cylinder with sufficient water
- Close the lid and put on the electrical heater.
- Adjust the safety valve to the required pressure.
- After the water boils, allow the steam and air mixture to escape through the discharge tap till all the air has been displaced
- This can be tested by passing the steam-air mixture liberated from the discharge tap into a pail of water through a connecting rubber tube. When the air bubbles stop coming in the pail, it indicates that all the air has been displaced by steam.
- Close the discharge tap.
- The steam pressure rises inside and when it reaches the desired set level (e.g. 15 pounds (lbs) per square inch in most cases), the safety valve opens and excess steam escapes out.
- Count the holding period from this point of time, which is about 15 minutes in most cases.
- After the holding period, stop the electrical heater and allow the autoclave to cool until the pressure gauge indicates that the pressure inside is equal to the atmospheric pressure.

- Open the discharge tap slowly and allow the air to enter the autoclave.
- Open the lid of the autoclave and remove the sterilized materials.



Figure 5: Autoclave

SLANT MEDIA PREPARATION

Slant media, also known as agar slants, are a common type of culture medium used in microbiology for bacterial growth.

Materials:

- Sterile test tubes with screw caps or cotton plugs
- Agar-based culture media
- Measuring cylinder or graduated pipette
- Flask or beaker
- Autoclave
- Bunsen burner or other source of sterile flame
- Test tube rack

Procedure:

- Prepare the agar media by following the manufacturer's instructions, typically dissolving powder in water and boiling it.
- Dispense the media into test tubes while tilting them to create a slanted surface when solidified.
- Sterilize the media in an autoclave to eliminate contaminants.
- Cool and solidify the media in the tubes.
- Label and store the slants for future use.

SLANT MEDIA STREAK

Streaking a slant media in microbiology is a technique used to isolate single bacterial colonies for further study.

Preparation:

- Gather sterile tools and materials.
- Clean workspace and wear gloves.

Inoculation:

- Sterilize the inoculating loop with a Bunsen burner flame.
- Collect a sample of bacteria from a culture or swab.

Streaking:

- Make a single streak down the top of the slant with the inoculated loop.
- Flame the loop again.
- Use the cooled loop to create zigzag streaks across the slant, touching each other slightly. Repeat on the remaining area for dilution.

Finishing Up:

- Discard the used loop after final sterilization.
- Label the slant with relevant information.
- Incubate the slant under appropriate conditions for bacterial growth.

ANTIBIOTIC SENSITIVITY

A vital diagnostic technique in medicine for figuring out a bacterium's susceptibility to various antibiotics is antibiotic sensitivity, sometimes referred to as antimicrobial susceptibility testing. This knowledge is crucial for treating bacterial infections successfully and thwarting the growing threat of antibiotic resistance.

Procedure:

- Obtain 2 plates and the cultures of *E. coli* and *Staph. aureus*.
- Obtain a swab and dip it into the *E. coli* broth culture. Roll the swab against the inside of the tube to remove excess liquid.
- Streak one of the plates with the swab in even strokes to obtain a uniform growth pattern across the entire surface of the plate.
- Rotate the plate 90 degrees and using the same swab, streak the plate again. Rotate the plate 45 degrees and reswab.
- Replace the lid. Discard the swab. Label the plate.
- Repeat the above procedure for *Staph. aureus* with a new plate.
- Allow the plates to dry for 2-5 minutes.
- Remove the forceps from the alcohol beaker and pass through the flame of a bunsen burner. When all the alcohol has burned off, use the sterile forceps to aseptically remove one of each antibiotic disc from the dispenser and place it on each plate. You can draw pie lines on the back to divide each plate into 6 sections. The antibiotic discs used are: gentamicin, tetracycline, penicillin G, chloramphenicol, ampicillin and erythromycin.
- Repeat the alcohol-flame sterilization of the forceps and tap each disc gently onto the plate.
- Replace the lid, and invert the plate. Complete the label at the bottom of plates and incubate at 37°C for 2 days.
- Record the results by measuring the diameters of the zone of inhibition (ZOI).



Figure 6: Antibiotic sensitivity on Nutrient Agar

Interpreting the results:

The results of antibiotic sensitivity testing are typically reported as:

- **Susceptible (S):** The bacteria are inhibited by the standard dosage of the antibiotic.
- **Intermediate (I):** The bacteria may be somewhat resistant, and the doctor may need to consider other factors or a higher dose.
- **Resistant (R):** The bacteria are not inhibited by the antibiotic at clinically achievable doses.

Limitations:

- **Time:** It takes time for bacteria to grow and react to antibiotics. Faster tests are being developed, but currently, results may take 1-2 days.
- **Specificity:** The test only provides information on bacterial susceptibility, not fungal or viral infections.



Figure 7: Antibodies

MICROSCOPE OBSERVATION

1) *Haemophilus influenzae*: a type of bacteria that can cause a variety of infections, ranging from mild to severe.

- It appears rod-shaped under microscope.
- They stain pink under Gram staining.
- SAMPLE: CSF sample.
- Presence of WBC.

HEMATOLOGY

BLOOD SMEAR

Blood smear preparation is a routine laboratory procedure used to create a thin layer of blood cells on a glass slide for microscopic examination. This examination helps in diagnosing various blood disorders, infections, and other medical conditions.

Materials:

- Microscope slides
- Lancet
- Alcohol swabs
- Gauze pad
- Capillary tubes
- Glass spreader slide
- Staining solutions

Steps:

- Label a clean glass slide with the patient's name or ID.
- For capillary blood, clean puncture site, discard initial drop, and touch a small drop to the slide. For venous blood, transfer a drop using a capillary tube.
- Prepare smear: Place another slide at an angle to the first, pull back to create a thin, wedge-shaped smear.
- Allow smear to dry completely for 15-30 minutes.
- Optional fixation: Some tests may require fixation with methanol.
- Use staining solutions like Wright-Giemsa to differentiate blood cell types.
- Once stained, the blood smear is ready to be examined under a microscope to evaluate the size, shape, and number of different blood cells.

TIPS FOR PREPARING:

- Use a clean, grease-free slide.
- Use the correct amount of blood. A small drop is sufficient for a good smear.
- Apply even pressure when spreading the blood.

- Allow the smear to dry completely before staining.
- Follow the specific staining instructions for the test being performed.

CELL COUNTING

Cell counting is typically done for cells suspended in a liquid medium, such as blood, plasma, or cell culture broth. The results are expressed as the number of cells per unit volume (e.g., cells per milliliter).

- Two main methods for cell counting exist: manual and automated.
- Manual counting involves the use of a hemocytometer, where cells are visually counted within defined grid squares. Automated counting, on the other hand, utilizes electronic devices employing methods like electrical impedance or image analysis, offering rapid and precise cell counts with reduced user bias compared to manual methods.

LEISHMANN'S STAIN:

L	N	L	N	N	E	L	N	L	N
N	N	N	N	L	N	N	N	L	N
L	N	N	N	L	L	N	N	L	L
N	L	N	N	L	L	L	N	N	N
N	L	N	N	N	L	N	N	N	L
N	N	N	N	N	N	N	L	L	L
L	N	N	N	N	N	N	L	N	L
N	N	N	L	N	L	N	N	N	N
N	N	N	N	N	N	L	N	N	N
N	N	L	N	L	N	N	L	N	L

Neutrophils: 68%

Lymphocytes: 30%

Eosinophils: 1%

GEIMSA STAIN:

N	N	L	L	N	N	L	N	N	N
L	L	L	N	N	N	L	N	N	N
N	L	N	N	L	L	L	N	N	L
N	N	N	L	N	N	N	N	N	L
L	L	N	N	N	L	N	L	N	L
L	N	L	L	N	N	N	L	L	L
N	L	L	L	L	N	L	N	N	N
L	N	N	L	N	N	N	L	L	L
N	L	L	L	L	N	N	L	N	N
N	L	L	N	N	N	N	N	N	N

Neutrophils: 61%

Lymphocytes:39%



Figure 8: Cell counting machine

BLOOD GROUPING

Blood grouping is a vital medical operation used to identify a person's blood type. It is also referred to as Rh typing and ABO typing. This information is important for managing pregnancies as well as safe blood transfusions. The presence or lack of antigens (markers) on red blood cells and antibodies in the blood plasma (liquid portion) is used to classify blood types.

Materials:

- Sterile lancet
- Alcohol swabs
- Blood collection tube
- Glass slide

- Anti-A serum (containing antibodies against A antigens)
- Anti-B serum (containing antibodies against B antigens)
- Anti-D serum (for Rh typing, identifies Rh factor)
- Dropper

Procedure:

- Wash the hands to prevent contamination.
- Using a sterile lancet, a small amount of blood is drawn from a fingertip. The first drop is discarded to avoid contamination.
- A clean glass slide is marked with three circles.
- A small drop of blood is placed in each circle on the slide.
- Using separate droppers, one drop of Anti-A serum is added to the first circle, Anti-B serum to the second circle, and Anti-D serum (for Rh typing) to the third circle.
- The blood and serum in each circle are gently mixed with a stirrer or applicator tip.

Incubation: The slide is left undisturbed for a few minutes to allow for antigen-antibody interaction.

Observation: The slide is examined for agglutination (clumping) of red blood cells.

Interpretation:

- **Agglutination:** Clumping of red blood cells in a specific circle indicates the presence of a corresponding antigen on the cells.
- Clumping with Anti-A serum: Blood type A
- Clumping with Anti-B serum: Blood type B
- Clumping with both Anti-A and Anti-B: Blood type AB (universal recipient)
- No clumping with either Anti-A or Anti-B: Blood type O (universal donor)

Rh typing: Clumping with Anti-D serum indicates Rh-positive blood. No clumping indicates Rh-negative blood.

NOTE:

For the kit method, we will use a kit rather than slides or tiles.



Figure 9: Anti- A; Anti -B; Anti- C serums

MALARIAL TEST

[Rapid diagnostic tests (RDTs)]

Tests used for the presence of malaria parasites in blood are called immunochromatographic tests, or RDTs. Results can be obtained in 15 to 30 minutes, and they are simple to use. RDTs might not be as precise as blood smear microscopy, and they might not be able to distinguish between all malaria parasite species.

HOW DOES IT WORK?

The key players:

- **Malaria antigens:** These are proteins produced by the malaria parasite present in the blood of an infected person.
- **Antibodies:** Y-shaped molecules that can specifically bind to antigens.
- **Dye:** Attached to the antibodies, making them visible.

Procedure:

- A small amount of blood is collected, usually through a finger prick.
- The blood is placed on a test strip within the RDT cassette.
- The blood migrates along the strip, encountering dried antibodies designed to bind to specific malaria parasite antigens. If malaria is present, the antibodies latch onto the parasite antigens in the blood.
- Further down the strip, there's another zone with a different kind of antibody immobilized.

- This one acts like a capture agent. If the blood contained malaria antigens bound to the first antibody (carrying the dye), this whole complex gets captured at this zone, forming a colored line (**Test line - T**).
- Every RDT has a control line (C) that appears regardless of the presence of malaria. This ensures the test itself is functioning properly. It has antibodies that bind to the dye-tagged antibody itself, showing up as a colored line.

Interpreting the results:

- **Positive test:** If both the T and C lines appear, it indicates the presence of malaria antigens in the blood sample, suggesting a malaria infection.
- **Negative test:** Only the C line appears, signifying no malaria antigens were detected and likely no malaria infection.

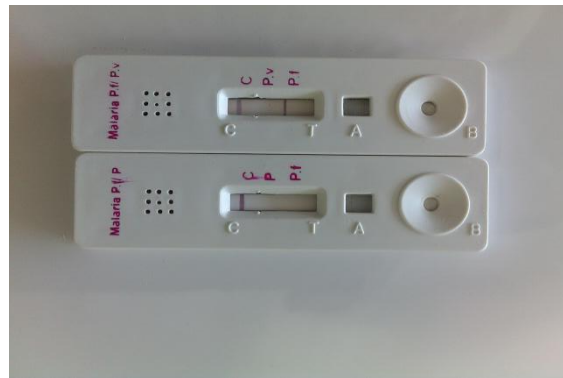


Figure 10: Malarial test kit

WIDAL TEST KIT METHOD

The Widal test kit method utilizes a process called **rapid slide agglutination** to detect antibodies against *Salmonella typhi* and paratyphi in a patient's blood, which can indicate typhoid fever. Here's a breakdown of the typical method.

Materials (usually included in the kit):

- Micropipettes
- Tips
- Gloves and Masks
- Glass slide with designated circles
- Widal antigens (O and H antigens for *Salmonella typhi* and paratyphi strains, depending on the kit)

- Positive control serum
- Negative control serum
- Patient's blood serum

Steps:

- Let everything (reagents, samples) reach room temperature.
- Shake the antigen vials.
- Label a slide with the patient's ID.
- Add a small amount of the patient's serum and control sera (positive and negative) to designated spots on the slide. Add drops of specific Salmonella antigens (O or H) to the remaining spots.
- Gently mix each serum-antigen mixture without cross-contamination.
- Observe the slide for red blood cell clumping (agglutination) within 15 minutes.

Interpretation:

- Agglutination in the patient's serum with positive control and no reaction in the negative control suggests a possible Salmonella infection.
- However, a healthcare professional needs to consider the specific pattern, dilution level (titre) of agglutination, and other patient symptoms for an accurate diagnosis.

BIOCHEMISTRY

URINE ANALYSIS

A urine analysis typically involves three parts: physical examination, chemical analysis, and microscopic examination.

1) PHYSICAL EXAMINATION:

- Color
- Clarity
- Odor
- Volume
- Specific Gravity
- Ph

2) CHEMICAL EXAMINATION: Protein, pH, glucose, bilirubin, urobilinogen, ketone bodies.

Typical Analytes Detected by Dipsticks:

- **pH:** Measures the acidity or alkalinity of urine.
- **Leukocytes (White Blood Cells):** Elevated levels might indicate infection.
- **Nitrites:** Presence can suggest a urinary tract infection (UTI).
- **Protein:** High levels can be a sign of kidney problems or other conditions.
- **Glucose (Sugar):** Can indicate diabetes or other issues.
- **Ketones:** Elevated levels might suggest uncontrolled diabetes or starvation.
- **Blood:** Presence of blood cells can have various causes.
- **Urobilinogen:** Abnormal levels can be related to liver problems.
- **Bilirubin:** Presence can indicate liver or bile duct issues.

3) MICROSCOPIC EXAMINATION:

- URINE DEPOSITS
 - Pus cells
 - Epithelial cells
 - Parasites
 - Yeast cells
 - Haematobium

- CRSTALS CASTS
 - Calcium oxalate
 - Calcium phosphate
 - Hyaline cast
 - Triple phosphate
 - Uric acid
 - Calcium carbonate

Observation:

- Red blood cells (RBCs)
- White blood cells (WBCs)
- Epithelial cells
- Casts

- Crystals
- Bacteria

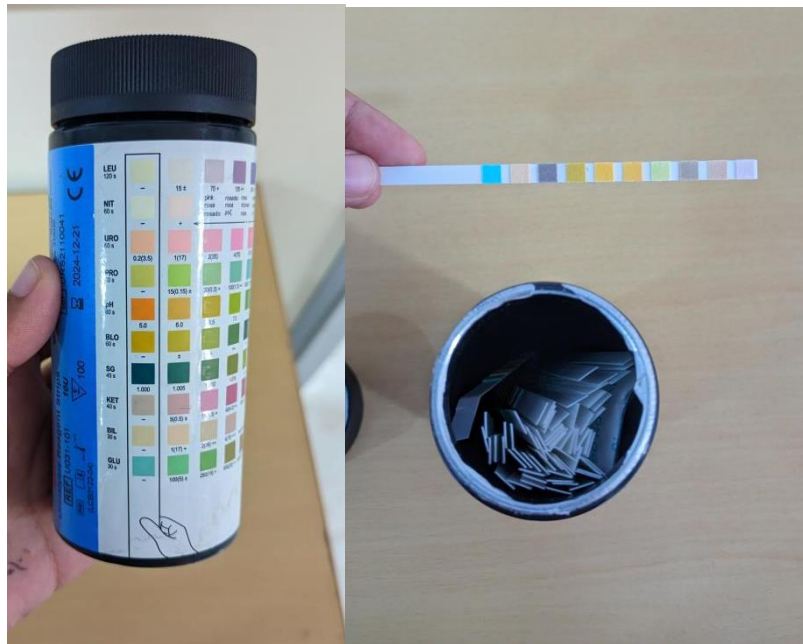


Figure 11: Urine test strip

PATIENT'S URINE ANALYSIS

NAME: MR. RAJA

AGE: 34

GENDER: MALE

BP: HYPERTENSION

TEMPERATURE: 36.5⁰C

URINE ANALYSIS

PHYSICAL EXAMINATION:

- COLOUR- Pale yellow
- TURBIDITY- Clear
- PH- Normal (6)

CHEMICAL- STRIP METHOD:

- Leukocytes- Normal
- Nitrites- Abnormal
- Urobilinogen- Abnormal
- Protein- +++

- PH- 6.00
- Blood- Normal
- Sugar-1.030
- Ketone- 4+
- Bilirubin- +
- Glucose- Normal

MICROSCOPE EXAMINATION:

- Triple phosphate crystals formation due to hypertension.
- Budding yeast
- Presence of mucous

AUTOMATION

SDS- PAGE

(Sodium Dodecyl Sulfate-Polyacrylamide Gel Electrophoresis.)

Sodium Dodecyl Sulfate-Polyacrylamide Gel Electrophoresis, or SDS-PAGE, is a potent method for dividing and examining proteins according to their molecular weight. It's a mainstay in molecular biology and biochemistry labs, offering insightful information on protein size, purity, and even possible function.

Materials Required:

- Protein samples
- Sample buffer
- Distilled water
- Microcentrifuge tubes
- Pipettes and tips
- Heating block or water bath

Procedure:

Preparation of the Gel:

- All the reagents are combined, except TEMED, for the preparation of gel.
- When the gel is ready to be poured, add TEMED.
- The separating gel is poured in the casting chamber.
- Add butanol before polymerization to remove the unwanted air bubbles present.
- The comb is inserted in the spaces between the glass plate.

- The polymerized gel is known as the “gel cassette”.

Sample Preparation:

- These are the proteins you want to analyze, likely in solution form (e.g., cell lysates, tissue extracts).
- The buffer typically contains Tris-HCl (maintains pH), SDS (linearizes and coats proteins), a reducing agent (disrupts disulfide bonds), glycerol (improves sample density), and sometimes a tracking dye (visualizes sample loading). The specific composition may vary depending on your protocol.
- Heating with the reducing agent disrupts protein folding and ensures linear polypeptide chains.

Electrophoresis

- The gel cassette is removed from the casting stand and placed in the electrode assembly.
- The electrode assembly is fixed in the clamp stand.
- 1x electrophoresis buffer is poured in the opening of the casting frame to fill the wells of the gel.
- Pipette 30ml of the denatured sample in the well.
- The tank is then covered with a lid and the unit is connected to a power supply.
- The sample is allowed to run at 30mA for about 1 hour.
- The bands are then seen under UV light.

Protein Visualization:

- After electrophoresis, stain the gel with a dye like Coomassie Brilliant Blue or silver stain. These dyes bind to proteins, making them visible.
- Remove excess stain to allow better visualization of individual protein bands.
- Capture a digital image of the gel using a gel documentation system or camera. The protein bands will appear as distinct lines on the gel, with their positions corresponding to their molecular weight.

CONCLUSION: It allows you to estimate protein sizes, assess sample purity, and potentially identify proteins of interest for further characterization.

DNA EXTRACTION

Materials required

- 500 micro- T. buffer
- 20 ul- SDS
- Lysis buffer- cell wall
- Protease- 5ul

Procedure:

- 500 micro- T. buffer
- 20 ul- SDS
- Lysis buffer- cell wall
- Take Protease- 5ul
- Incubate it for ½ hr
- Mix 500 ul Phenol Chloroform (Don't smell it)
- Centrifuge it 5000 RPM (5mins)
- Extrate the DNA pour the Suprenant
- Add sodium acetate- 20 ul
- For half of the remaining sample, add isopropanol- 50 ul
- Centrifuge 8000 RPM
- Pour the supernatant
- Add 70% ethanol – 500 ul
- Centrifuge 8000 RPM
- Pour the supernatant
- Keep in a deep fridge
- Electrophoresis

DOT ELISA

Dot-ELISA, or Dot Enzyme-Linked Immunosorbent Assay, is a versatile technique for detecting antigens (molecules the body reacts to) or antibodies (molecules produced by the immune system) in a sample. It's a rapid, cost-effective alternative to traditional ELISA assays and is particularly useful for:

- Screening large numbers of samples
- Detecting specific antibodies in patient sera
- Identifying antigens in crude extracts

Materials:

- Samples Blocking buffer Wash buffer
- Conjugate
- Substrate solution
- Stop solution
- Dot-ELISA membrane
- Dot-blot apparatus

Procedure:

Preparation of Membrane:

- Cut the membrane into appropriate size strips.
- Coat the membrane with the antigen or antibody of interest. Allow it to dry completely.
- Wash the membrane with PBS to remove any unbound antigen or antibody.

Blocking:

- Incubate the membrane in blocking buffer for about 1 hour at room temperature or overnight at 4°C. Blocking helps to prevent nonspecific binding.

Incubation with Primary Antibody/Antigen:

- Add the sample (containing the antigen or antibody of interest) onto the membrane strip.
- Incubate the membrane with the sample for a suitable time period (typically 1-2 hours) at room temperature or at 4°C overnight.

Washing:

- Wash the membrane strip with wash buffer to remove any unbound primary antibody/antigen. Repeat this step 3-4 times.

Incubation with Secondary Antibody:

- Add the secondary antibody conjugated with an enzyme (e.g., HRP) onto the membrane strip.
- Incubate the membrane with the secondary antibody for about 1 hour at room temperature.

Washing:

- Wash the membrane strip again with wash buffer to remove any unbound secondary antibody. Repeat this step 3-4 times.

Detection:

- Add the substrate solution for the enzyme onto the membrane strip.
- Incubate the membrane for a short period, typically 5-30 minutes, at room temperature.
- Observe for the development of color or other visible signals.

Stop Reaction :

- If using a colorimetric substrate, stop the reaction by rinsing the membrane with deionized water or by adding a stop solution.

Observation: Pre coated strip

- Positive control- +
- Test control- +
- Negative control- -

Interpretation:

- The presence of the target antigen or antibody in your sample at a detectable level. The intensity of the color can be an indicator of the relative amount of the target molecule present.
- The positive control strip shows a positive signal, it indicates that the assay itself is functioning correctly.

SANDWICH ELISA

Sandwich ELISA, also known as Enzyme-Linked Immunosorbent Assay, is a powerful technique used to detect and quantify the amount of a specific antigen (a molecule the body reacts to) present in a sample. It relies on the specific binding of antibodies to the target antigen.

Materials:

- Microplate
- Capture antibody
- Blocking buffer
- Wash buffer
- Standards
- Samples

- Detection antibody
- Substrate solution
- Stop solution
- Plate reader

Procedure:

Blocking and adding samples

- Block the remaining protein-binding sites in the coated wells by adding 200 μ L blocking buffer (5% non-fat dry milk/PBS) per well.
- Cover the plate with adhesive plastic and incubate for at least 1–2 h at room temperature or overnight at 4°C.
- Wash the plate twice with 200 μ L PBS.
- Add 100 μ L of diluted samples to each well. Always compare signal of unknown samples against those of a standard curve. Run standards (duplicates or triplicates) and blank with each plate. Incubate for 90 min at 37°C.
Remove samples and wash the plate twice with 200 μ L PBS.

Incubation with detection and secondary antibody:

- Add 100 μ L of diluted detection antibody to each well.
Cover the plate with adhesive plastic and incubate for 2 h at room temperature.
- Wash the plate four times with PBS.
- Add 100 μ L of conjugated secondary antibody, diluted in blocking buffer immediately before use.
- Cover the plate with adhesive plastic and incubate for 1–2 h at room temperature.
- Wash the plate four times with PBS.

AUTOMATION MACHINE OBSERVATION

1) Mindray BS-240: The Mindray BS-240's ability to produce reliable results with a sample capacity of 30–40 has amazed me. Based on the data it processes, its internal algorithms appear to optimize performance, which may suggest that machine learning is impacting its analysis capabilities.

- SAMPLE TYPE: Plasma/ Serum/ CSF/ urine/ others
- RATIO OF DETERGENT: 1: 9 (1- detergent; 9- distilled water)

2) Hematology Analyzer: Mindray BC- 5130

The **Mindray BC-5130** is a hematology analyzer designed to efficiently provide complete blood count (CBC) results with a 5-part white blood cell differential.

- **Function:** Analyzes blood samples to measure various cell counts and characteristics, offering a comprehensive picture of a patient's blood health.
- **5-Part Differential:** Provides detailed information on the five main types of white blood cells (WBCs): lymphocytes, monocytes, neutrophils, eosinophils, and basophils. This advanced differentiation helps in diagnosing various blood disorders and infections.

3) **Glycosylated Hematology Analyzer:** Only for diabetic patients.

FACTORS OF MAINTAINING THE MACHINE

- Quality Control
- Calibrated Sheet (High/Low)
- Annual Maintenance
- Service Report



Figure12:Mindray BS-240



Figure 13: Hematology Analyzer: Mindray BC- 5130

BLOOD BANK

INTRODUCTION

What Is Blood Banking?

Blood banking ensures donated blood's safety for transfusions, originating in 1937 by Dr. Bernard Fantus. Around 13.6 million units of blood are donated annually, meeting a daily demand of 36,000 units. Centralized blood banks consolidate activities under one roof with multiple branches, while decentralized banks distribute tasks across hospital departments. Both types play vital roles in collecting, testing, storing, and distributing blood for medical use, ultimately saving countless lives.

Function Of Blood Bank

Blood banks, housed in hospital laboratories or community centers, collect, process, and distribute human blood and its components (red blood cells, plasma, platelets) for transfusions, supporting life-saving efforts and conducting research to improve donor screening and offer solutions for minimizing blood loss during surgeries.

BLOOD DONOR (SELECTION/ REJECTION)

Blood Donor Selection

Blood donor selection aims to ensure the safety of both donors and recipients by assessing prospective donors for suitability before each donation. Its goals include protecting donor health, ensuring patient safety by collecting blood only from suitable donors, identifying factors that may make an individual unsuitable for donation temporarily or permanently, minimizing deferrals of safe donors, maintaining the quality of blood products, and reducing resource wastage due to unsuitable donations. The steps involved in the donor selection process are:

- Donor registration
- Pre-donation information
- Completion of donor questionnaire
- Donor interview and pre-donation counselling
- Donor health and risk assessment

Rejection

All donors go through a brief screening, including a health interview and medical history, a hemoglobin test, temperature, pulse rate, and blood pressure. From this information, a decision about your ability to donate blood is made. Certain conditions mean you may never be able to follow the dictates of your community conscience. A history of hepatitis, heart disease, cancer and bleeding disorders, convulsions or AIDS or being in an AIDS risk group will disqualify you.

TYPES OF BLOOD BAGS

Single Blood Bag

- For whole blood collection.
- The bag contains CPDA solution.
- Available in capacity of 350ml and 450ml.

Double Blood Bag

- For whole blood collection.
- Separation of 2 different blood components (red blood cells and plasma) is obtained through the process of centrifugation and extraction.

Triple Blood Bag

- Triple Blood Bag with SAGM, for whole blood collection.
- Separation of 3 different blood components (red blood cells, plasma and platelets).
- The primary bag contains CPD and one satellite bag contains SAGM.

Quadruple Bag

- Used to separate packed cells, plasma, platelets and cryoprecipitate.



Figure 14 : Blood bags

BLOOD DONOR REQUEST FORM

Requirement

- Patient Name
- Age
- Gender
- Blood Type
- State
- City
- Hospital
- Reason For Requirement (Any Disease)
- Required Before

Contact Details

- Contact Name
- Phone Number
- Mobile Number
- E Mail

BLOOD DONATION

Before Blood Donation

- Make sure your Hb is within normal range.

- Eat iron-rich diet like beans, spinach, fish, red meat and iron-fortified cereals.
- Have a sound sleep and drink lots of fluids.
- No alcohol should be consumed before the donation day.
- Stop taking blood thinning medication before 2-3 days, if any.

Day Of Blood Donation

- Drink extra water or non-alcoholic drink before donation.
- Avoid fatty food like fries, burger etc.
- Wear a shirt with loose sleeves that can be rolled up the elbows easily.
- Take all prescriptions or medications with you, if any.
- Bring a photo identity proof.
- Talk to other donors or staff and relax.

After Blood Donation

- Keep bandage on the area of prick for next several hours.
- Keep sitting for few minutes after donating blood.
- Eat refreshment given by the staff, you have earned it.
- Do not do any strenuous exercise like weight lifting for the rest of the day.
- If the site bleeds, apply pressure and raise arm for few minutes until bleeding stops.
- In case of dizziness, lie down until you feel better.
- Keep taking iron-rich diet to replace the lost iron store from body.



Figure 15: Haemoglobin test machine

DONOR COUNSELLING

Counselling donors is an important and integral part of blood banking. Counsellors have various roles to play in the blood banking setup. A counsellor plays the role of speaking to the donor before blood donation where he/she encourages the donor to donate and gets an assurance that required pre donation criteria is met.

Blood Grouping

Every person needs to know their blood group and also that of their family members. There are many occasions on which knowing your blood group or blood group check can come in handy such as an accident.

Principle Of Blood Grouping

Human blood comprises four main components: red blood cells, white blood cells, plasma, and platelets. The ABO blood grouping system categorizes individuals into Type A, Type B, Type AB, or Type O based on the presence or absence of antigens A and B on red blood cells. Additionally, the Rhesus factor, or Rh factor, further classifies blood into positive or negative types based on the presence of the Rhesus factor D antigen. Rhesus positive indicates the presence of the antigen, while Rhesus negative indicates its absence. These classification systems help determine compatibility for blood transfusions and medical procedures.

Forward Blood Grouping

Red blood cells are tested for A and B antigens using known anti-A and anti-B sera.

Abo Blood Grouping Test Procedure

- Take one sanitized and clean tile.
- Make A, B & D on it by making circles below it.
- Put one drop of blood on it.
- Don't forget to label the identification number of the blood and the date on the tile.
- Put one drop of Anti-A, Anti-B, and Anti-D on each three drops.
- Mix it with a mixing stick.

(NOTE: discard each mixing stick after visiting)

- After mixing, tilt back and forth for 2 mins.
- We can see the agglutination in the respective blood drop.

Reverse Blood Grouping

Serum is tested for anti-A and anti-B antibodies using known A and B red cells.

Tube Method

- Label two test tubes as A and B.
- Add two drops of serum to be tested in each tube.
- Add one drop each of A and B cells suspension to the corresponding test tubes.
- Mix well and centrifuge both tubes at 1000 rpm for 1 minute.
- Gently remove the tubes and completely resuspend cells and examine microscopically for agglutination and if negative, microscopically.
- Record the reactions and interpret the results.



Figure 16: Anti Sera



Figure 17: Blood Grouping

BLOOD SCREENING

The screening of donated blood and the quarantine of blood and blood components represent critical processes that should be followed to ensure that blood units are safe. Based on the screening results, they should either be released for clinical or manufacturing use or be discarded. All blood samples, donations and components should be correctly labelled to ensure correct identification throughout the screening process.

HIV

An HIV test checks a sample of your blood to see whether you are infected with HIV (human immunodeficiency virus). There are three main types of HIV tests. They are all very accurate, but no test can find HIV in your body immediately after you're infected.

- HIV antibody tests
- HIV antibody/antigen tests
- NAT tests

HCV

- You can be infected with the hepatitis C virus (HCV) and have no symptoms. Definitely get screened if any of these things apply to you.

- You were born between 1945 and 1965.
- You use or inject drugs.
- Logo for WebMD
- Logo for WebMD
- Check Your Symptoms
- Find a Doctor
- Find a Dentist
- Connect To Care
- Find Lowest Drug Prices
- Health a-z
- Drugs & Supplements
- Living Healthy
- Family & Pregnancy
- You can be infected with the hepatitis C virus (HCV) and have no symptoms. Your doctor could find it when they check your blood and see that your level of certain liver enzymes is high. If that happens, they'll follow up with other tests to confirm you have the disease.

Who Should Get Tested for Hepatitis C?

The CDC recommends that you get tested at least once no matter what. Definitely get screened if any of these things apply to you:

- You were born between 1945 and 1965.
- You use or inject drugs.
- You have ever injected drugs even if it was just once or a long time ago.
- You have HIV.
- You're on kidney dialysis.
- You have abnormal alanine aminotransferase levels (ALT).
- You had a blood transfusion, blood components, or an organ transplant before July 1992.
- You've ever gotten clotting factor concentrates made before 1987.
- You received blood from a donor who later tested positive for hepatitis C virus.
- We screened HBS Ag ; VDRL; Malaria.

COMPONENT SEPARATION

To properly study blood cells, the individual cell type must be isolated to remove contamination interference.

Rbc Separation From Whole Blood Sample

RBCs can be separated or isolated from whole blood in a variety of ways, but some are more efficient than others. While it might take extra money and time to preserve the extracted RBCs, certain methods (such as RBC depletion) simply remove the contaminants without damaging the surrounding blood cells.

Plasma Separation From Blood Centrifugation

Blood separation techniques, primarily centrifugation, utilize physical forces to isolate plasma from the blood by pushing denser particles to the outer edges of the sample. This results in three layers: red blood cells (RBCs), a mixture of white blood cells (WBCs) and platelets, and plasma. Whole blood, composed of cells, colloids, and crystalloids, can be separated into various blood components including packed red blood cell (PRBC) concentrate, platelet concentrate, fresh frozen plasma, and cryoprecipitate.

Platelets

A method of separating platelets from whole blood has been developed. The method involves simple centrifugation with blended silicone fluids. Quantitative recovery of platelets is achieved. Platelets appear to have no loss of ability to promote clot retraction in platelet-poor plasma.

White Blood Cells

A convenient way of obtaining white cells from whole blood is simply to allow EDTA blood to settle in siliconized glasses and then pipette off the leucocyte-rich supernatant after 1.5 h or more. A more rapid separation occurs when agents that aggregate erythrocytes are added to the blood.



Figure 18: Centrifuge



Figure 19: Refrigerator Centrifuge



Figure 20: Plasma thawing bath machine



Figure 21: Blood bag sealer

STORAGE

PACKED RBC

PRBCs are stored in a Blood Bank refrigerator at a temp of 1-6°C until issue. The shelf life is 42 days from the date of collection.



Figure 22: Blood bank refrigerator

FRESH FROZEN PLASMA (FFP)

Fresh Frozen Plasma (plasma separated from a unit of blood within 6-8 hrs of donation and rapidly frozen) is stored in the Blood Transfusion center at -40 degrees C or colder. It has a shelf life of one year.



Figure 23: Fresh frozen plasma

CRYOPRECIPITATE

For preparation of cryoprecipitate plasma is separated from a unit of blood within 6-8 hrs of donation and rapidly frozen within 30 minutes, plasma is then thawed slowly at below +4 degree C to obtain maximum yield of cryoprecipitate. It is finally stored in Blood Transfusion centre at -40 degree C or colder. It has a shelf life of one year.

PLATELET RICH PLASMA

Platelet-rich plasma (PRP) is prepared manually or through automated methods and stored at 22-24°C in platelet agitator cum incubator to preserve platelet function, vital for preventing or stopping bleeding in patients with thrombocytopenia or bone marrow failure. With a shelf life of 3-5 days, depending on the blood bag type, PRP storage at room temperature poses a risk of bacterial contamination. Thus, maintaining the platelet storage area temperature below +24°C is crucial to mitigate this risk.



Figure 24: Refrigerator

BLOOD ISSUE

Recipient's name and identification number

- Recipient's ABO group
- Recipients Rh group
- Identification number and name of blood component
- ABO group of the blood component
- Rh group of the blood component for red cells, platelets and granulocytes
- Compatibility verification for red cells and granulocytes
- Visual inspection
- Date and time of issue
- Identity of the person issuing the blood component
- Identity of the person transporting the blood component to the recipient's location

CROSS-MATCHING

Crossmatching is crucial to determine compatibility between donor blood or organs and the recipient's own. The procedure aims to identify recipient antibodies against donor red blood cells to prevent severe complications like hemolytic anemia or death post-transfusion. Three types of cross-matches are conducted.

- **Major crossmatch:** Identifies recipient antibodies against donor red blood cell antigens, utilizing recipient serum and donor red blood cells.
- **Minor crossmatch:** Detects donor serum antibodies against recipient red blood cells, requiring donor serum and recipient red blood cells.
- **Auto control:** Includes recipient serum with recipient red blood cells as a control measure in the crossmatching process.

COOMB'S TEST

- The Coombs test assesses blood for antibodies targeting red blood cells, commonly used in pre-procedural screening or to diagnose conditions like autoimmune haemolytic anaemia. It comprises two types:
- **Direct Coombs test:** Examines red blood cells for attached antibodies, aiding in diagnosing autoimmune haemolytic anaemia, where the body prematurely destroys red blood cells.
- **Indirect Coombs test:** Identifies antibodies in the bloodstream that could bind to red blood cells, serving as a screening tool for transfusion reactions. It is also routinely conducted in prenatal testing.

PROCEDURE OF DIRECT COOMB'S TEST

- Prepare a 5 % suspension in isotonic saline for the red blood cells to be tested.
- With a clean pipette add one drop of the prepared cell suspension to a small tube.
- Wash three times with normal saline to remove all the traces of serum.
- Decant completely after the last washing.
- Add two drops of Anti-human serum.
- Mix well and centrifuge for one minute at 1500 RPM.
- Resuspend the cells by gentle agitation and examine macroscopically and microscopically for agglutination.



Figure 25: Incubator

PROCEDURE OF INDIRECT COOMB'S TEST

- Label three test tubes: T (Test serum), PC (Positive control), and NC (Negative control).
- Add 2 drops of test serum to the tube labeled T, 1 drop of anti D serum to PC, and 1 drop of normal saline to NC.
- Introduce one drop of 5% saline suspension of pooled 'O' Rho (D) positive cells into each tube.
- Incubate all tubes at 37°C for one hour, then wash the cells three times in normal saline to remove excess serum.
- Add two drops of Coombs serum (anti-human serum) to each tube, allow to sit for 5 minutes, then centrifuge at 1,500 RPM for one minute. Finally, resuspend the cells and examine them both macroscopically and microscopically.

NEGATIVE RESULTS

- No clumping of cells (no agglutination). This means you have no antibodies to red blood cells.

POSITIVE RESULTS

- Clumping in a direct Coombs test indicates antibody presence on red blood cells, potentially leading to haemolysis. Associated conditions include:
 - Haemolytic anaemia
 - Chronic lymphocytic leukaemia
 - Erythroblastosis fetalis
 - Infectious mononucleosis
 - Mycoplasma infection
 - Syphilis
 - Systemic lupus erythematosus
 - Transfusion reactions.

BLOOD BANKING RECORDS

- Complete records of blood component identification, Transfusion Medicine Laboratory testing results, and collecting facility must be retained indefinitely.
- Recipient transfusion data files in the Transfusion Medicine Laboratory are also to be retained indefinitely.
- Records for each blood product issued should include recipient's name and ID, blood product details, volume/potency, dosage, visual inspection, date/time of issue, and identities of issuing and transporting personnel.
- Inspection records of blood components and products prior to issue should be kept for five years.
- Record systems across all facilities must allow tracing of blood components and products from source to final disposition, with records kept indefinitely.
- Transfusion Medicine Laboratory must maintain records demonstrating effective operation of the quality system, including healthcare employee signatures, initials, and computer identifiers.

CONCLUSION

My internship has been a great learning experience. I've learned a lot about working in a laboratory of **Sathyabama General Hospital**, from **01.11.2023 to 30.11.2023**. Studying tiny organisms in microbiology to understanding blood and urine tests in hematology and biochemistry. I've also picked up skills in using advanced machines for analysis.

I want to thank all the experts who guided me during this internship. They've not only taught me practical skills but also helped me understand the importance of being careful and accurate in lab work.

Now, I'm excited to use what I've learned to start my career in healthcare. I'm confident that I can make a positive impact with the skills and knowledge I've gained.

Overall, I'm grateful for this internship opportunity and excited about the future in the field of laboratory sciences.

It was a great experience for me. I have learned so many valuable things which will help me in my future a lot. I have learned how to take and communicate with donors, the basic qualities of a lab technician. A lot about day-to-day work in the blood bank. How to do cross-matching, plasma separation, Coomb's test i.e., screening, How to count Fresh frozen plasma, but the most important is the discipline and honesty towards my job and work. I am very sure that this experience will help me a lot, plus the guidance our lab

technicians and doctor provided us was incredible. This whole internship week from **14/11/22 to 19/11/22** is just about learning, practicing, and growing in our course and job. I will be always thankful to our honorable Ms. Jasmine ma'am for conducting this internship and to the doctor and lab technicians who help us to handle everything and practice in labs.



Figure 26: LION'S BLOOD BANK

FIGURE NO.	DESCRIPTION	PAGE NO.
1	Nutrient Agar	
2	TSI-A	
3	Citrate	
4	MacConkey- Agar	
5	Autoclave	
6	Antibiotic Sensitivity in Nutrient Agar	
7	Antibodies	
8	Cell counting machine	
9	Anti- A; Anti-B & Anti-c serum	
10	Malrial test kit	
11	Urine test strip	
12	Mindray BS- 240	
13	Haematology Analyzer: Mindray BC- 5130	
14	Blood bags	
15	Haemoglobin test machine	
16	Anti- Sera	
17	Blood Grouping	
18	Centrifuge	
19	Refrigerator Centrifuge	
20	Plasma thawing bath machine	
21	Blood bag sealer	
22	Blood bank refrigerator	
23	Fresh frozen plasma	
24	Refrigerator	
25	Incubator	
26	Lion'S Blood Bank	

SATHYABAMA
INSTITUTE OF SCIENCE AND TECHNOLOGY
(Deemed to be University)
Accredited with A++ Grade by NAAC
CATEGORY 1 UNIVERSITY BY UGC
Jeppiaar Nagar, Rajiv Gandhi Salai, Chennai 600119



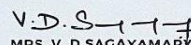
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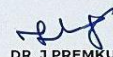
This Internship program certificate is awarded to

Ms. PRIYANKA KUMARI

for her outstanding completion of Internship Program on Exploration of
Diagnostic Laboratory Techniques at Sathyabama General Hospital during
01.11.2023 to 30.11.2023. She has learned to do routine lab work and has been
aware of basic laboratory procedures.

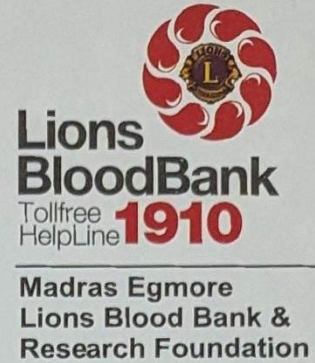

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MEDICAL SUPERINTENDENT
SATHYABAMA GENERAL HOSPITAL

Sharing Life. Saving Lives..since 1984



Date: 12th Dec 2022

TO WHOMSOEVER IT MAY CONCERN

This is to certify that Ms. Priyanka Kumari, BSc in MLT, 2nd year of Sathyabama Institute of Science and Technology, Chennai - 119, undergone Internship training in Madras Egmore Lions Blood Bank & Research Foundation(Ambattur Unit), Chennai - 58. She has been observed blood bank procedures including Bleeding the Donors, Bloodgrouping, Cross-matching, Component separation, TTI screening and attend Blood donation camp for the period from 21st Nov 2022 to 26th Nov 2022

During her internship, performance was good and she was able to complete the project on time.

We wish him all the best for her upcoming career.

Ln.J.Madanagopal Rao
Chairman



This project made possible through the co-operation of Lions Club International Foundation, Clubs in the District 324 - A1, A5 & A6 and well wishers - sponsored by Lions Club of Madras Egmore

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