

INTERNSHIP REPORT

Submitted to

SATHYABAMA INSTITUTE OF SCIENCE AND TECHNOLOGY

In partial Fulfilment for the Award of The Degree Of

BACHELOR OF SCIENCE

In

MEDICAL LABORATORY TECHNOLOGY

By

Ms SURUTHIKA P (41737019)

DEPARTMENT OF MEDICAL LABORATORY TECHNOLOGY

SCHOOL OF ALLIED HEALTH SCIENCES



SATHYABAMA

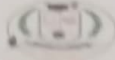
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APRIL 2024



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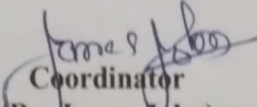
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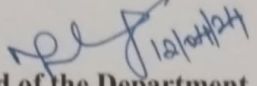
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DEPARTMENT OF MEDICAL LABORATORY TECHNOLOGY

BONAFIDE CERTIFICATE

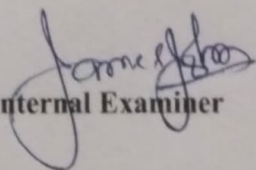
This is to certify that this internship report is the bonafide work of **P.SURUTHIKA** who have done the internship work as a team and carried out the training program at **SATHYABAMA INSTITUTE OF SCIENCE AND TECHNOLOGY** and **LIONS BLOOD BANK** at **AMBATTUR** under our supervision from August 2023 to April 2024.

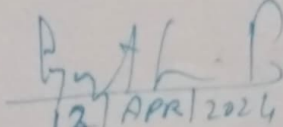

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DECLARATION

I, **P. SURUTHIKA (41737019)**, 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**” under the guidance of **Dr. JAMES JOHN** at Sathyabama Institute of Science and Technology is submitted in partial fulfilment of the requirements for the award of Bachelor of science degree in **MEDICAL LABORATORY TECHNOLOGY**.

DATE: 12.04.2024

PLACE: CHENNAI

P. Suruthika
(Ms.P.SURUTHIKA)

DECLARATION

*I, P. SURUTHIKA(41737019), 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 “ **VOLUNTARY HEALTH SERVICES at Adyar**” under the guidance of **Dr. JAMES JOHN** at Sathyabama Institute of Science and Technology is submitted in partial fulfilment of the requirements for the award of Bachelor of science degree in **MEDICAL LABORATORY TECHNOLOGY**.*

DATE:

PLACE: CHENNAI

(Ms.suruthika.P)

ACKNOWLEDGEMENT

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We would like to express our thanks to our parents for their unwavering support to us during these years.

<i>S.No:</i>	<i>Topic</i>	<i>Page No.</i>
1.	<i>Introduction</i>	1
2.	MICROBIOLOGY	1
3.	<i>Biochemical;TSl-A</i>	2
4.	<i>Citrate</i>	3-4
5.	<i>Media preparation</i>	4
6.	<i>Macconkey Agar</i>	5-6
7.	<i>Blood agar</i>	6-7
8.	<i>Agar Agar</i>	8-9
9.	<i>Salmonella shigella</i>	9-10
10.	<i>XLD</i>	11-12
11.	<i>Autoclave</i>	13-14
12.	<i>Slant preparation</i>	15-16
13.	<i>Streaking</i>	16-17
14.	<i>Safty measures</i>	17-18
15.	HEMATOLOGY	19
16.	<i>Blood smear</i>	19-21
17.	<i>Cell counting</i>	21-23

18.	CLINICAL PATHOLOGY	23
19.	<i>Urin analysis</i>	23-25
20.	IMMUNOLOGY	25
21.	<i>Sandwich ELISA</i>	25-27
22.	<i>SDS page</i>	27-28
23.	BLOOD BANK	29
24.	<i>Introduction</i>	29
25.	<i>Donor selection criteria</i>	29-30
26.	<i>Donor rejection criteria</i> <i>Blood</i>	30-31
27.	<i>Blood donor request</i> <i>form</i>	31
28.	<i>Blood bag</i>	31-33
29.	<i>Donor counseling</i>	33-34
30.	<i>Blood grouping</i>	34-35
31.	<i>Blood screening</i>	39-40
32.	<i>Blood components</i> <i>separation</i>	40-42
33.	<i>Cross matching</i>	42-44
34.	<i>Blood banking records</i>	44
35.	<i>conclusion</i>	44

36.	<i>Sathyabama gentral hospital certificate</i>	46
37.	<i>bood banking certificate</i>	47

PLACE OF VISIT;

1.lions blood bank,ambatour

2.sathyabama institute of science and technology

I haave good experience of observe all kinds of tests done in blood bank and sathyabama university .we have learnt the test under the departments of blood bank..Phlebotomy,Microbiology,Hematology ,Automation of quality management i have prepared the report of whole internship.

2. MICROBIOLOGY

BIOCHEMICAL

- ✓ TSI-A
- ✓ Citrate



Figure(1);biochemicals

3. TSI-A

Ingredients:

- ✓ *Peptone*
- ✓ *Beef extract*
- ✓ *Yeast extract*
- ✓ *Proteose peptone*
- ✓ *Lactose*
- ✓ *Sucrose*
- ✓ *Glucose*
- ✓ *Sodium chloride*
- ✓ *Ferrous sulfate*
- ✓ *Agar*
- ✓ *Preparation:*

- ▶ *Dissolve the appropriate amounts of peptone, beef extract, yeast extract, proteose peptone, lactose, sucrose, glucose, and sodium chloride in distilled water according to the manufacturer's instructions or the recipe you are following.*
- ▶ *Adjust the pH of the solution to around 7.2-7.4 using either hydrochloric acid (HCl) or sodium hydroxide (NaOH).*
- ▶ *Add ferrous sulfate solution to the mixture. Ferrous sulfate acts as an indicator for hydrogen sulfide production.*
- ▶ *Add agar to the solution to solidify it.*
- ▶ *Dispense the medium into tubes or plates and autoclave at 121° C for 15 minutes to sterilize.*

Storage:

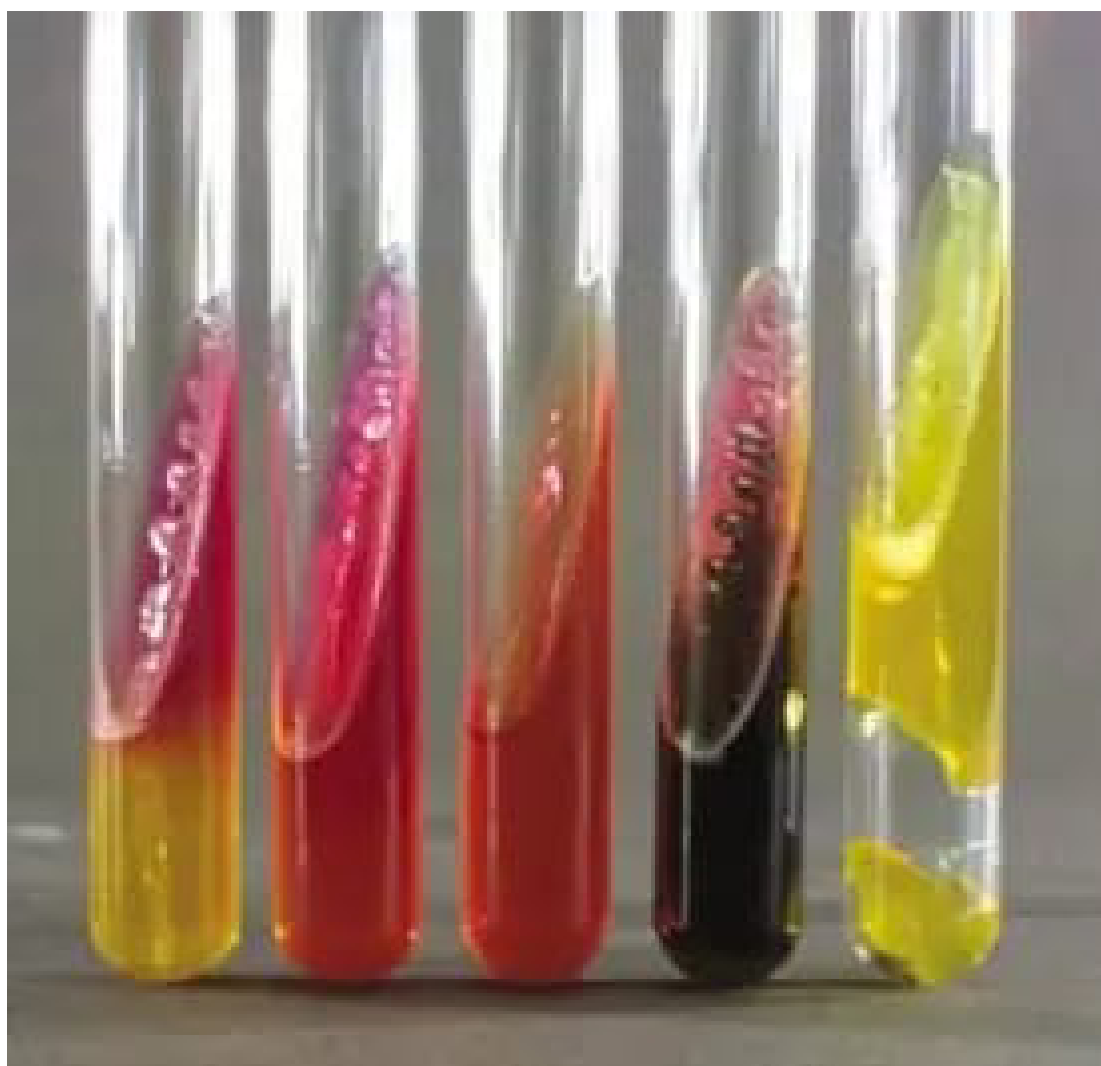
- ▶ *Store the prepared agar plates or tubes in a cool, dry place away from direct light. Properly sealed plates can typically be stored for several weeks to months.*

► *Quality Control:*

- *Ensure that the pH of the medium is within the acceptable range.*
- *Check for any signs of contamination before use.*
- *Perform appropriate positive and negative control tests to verify the medium's performance.*

Usage:

- *Inoculate the TSI Agar with the bacterial culture using a sterile inoculating loop.*
- *Incubate the plates or tubes aerobically at 35-37° C for 18-24 hours.*
- *After incubation, observe the color changes and other reactions in the medium.*
Interpret the results based on the characteristic reactions of different bacteria on TSI Agar



Figure(2);TSI

4.CITRATE;

Ingredients:

- ✓ Sodium citrate
- ✓ Ammonium dihydrogen phosphate
- ✓ Dipotassium hydrogen phosphate
- ✓ Magnesium sulfate
- ✓ Agar

Preparation:

- ▶ Dissolve the appropriate amounts of sodium citrate, ammonium dihydrogen phosphate, dipotassium hydrogen phosphate, and magnesium sulfate in distilled water according to the manufacturer's instructions or the recipe you are following.
- ▶ Adjust the pH of the solution to around 7.0 using either hydrochloric acid (HCl) or sodium hydroxide (NaOH).
- ▶ Add agar to the solution to solidify it.
- ▶ Dispense the medium into tubes or plates and autoclave at 121° C for 15 minutes to sterilize.
- ▶ Storage:
- ▶ Store the prepared agar plates or tubes in a cool, dry place away from direct light. Properly sealed plates can typically be stored for several weeks to months.

Quality Control:

- ▶ Ensure that the pH of the medium is within the acceptable range.
- ▶ Check for any signs of contamination before use.
- ▶ Perform appropriate positive and negative control tests to verify the medium's performance.
- ▶ Usage:
- ▶ Inoculate the Citrate Agar with the bacterial culture using a sterile inoculating loop.
- ▶ Incubate the plates or tubes aerobically at 35-37° C for 18-24 hours.

- *After incubation, observe the growth and color change of the medium. Interpret the results based on the characteristic reactions of different bacteria on Citrate Agar.*



Figure(3);citrate

5.MEDIA PREPARATION

- ✓ *Macconkey agar*
- ✓ *Blood agar*
- ✓ *Agar agar*
- ✓ *Salmonella shigella*
- ✓ *XLD*

6.MACCONKEY AGAR

INGREDIENTS

Peptone:

- *Provides a source of nitrogen for bacterial growth.*

Lactose:

- ▶ Fermentable carbohydrate that allows differentiation of lactose-fermenting bacteria from non-lactose fermenters.

Bile salts:

- ▶ Selectively inhibit the growth of Gram-positive bacteria.

Crystal violet:

- ▶ Also inhibits the growth of Gram-positive bacteria.

Neutral red:

- ▶ pH indicator, turns pink/red in acidic conditions.

Agar:

- ▶ Solidifying agent.

Procedure;

Weighing and Dissolving Ingredients:

- ▶ Weigh out the required amounts of peptone, lactose, bile salts, crystal violet, neutral red, and agar according to the formulation of MacConkey agar being used.
- ▶ Dissolve these ingredients in distilled water by gentle heating while stirring to ensure complete dissolution.

Adjusting pH:

- ▶ MacConkey agar is typically slightly acidic (pH around 7.1). Adjust the pH using 1N NaOH or 1N HCl as necessary. pH is critical for the differentiation of lactose fermenters and non-lactose fermenters.

Autoclaving:

- ▶ Once the medium is prepared and the pH is adjusted, the medium should be sterilized by autoclaving at 121° C for 15 minutes. This step ensures that the medium is free from any contaminating microorganisms.

Pouring Plates:

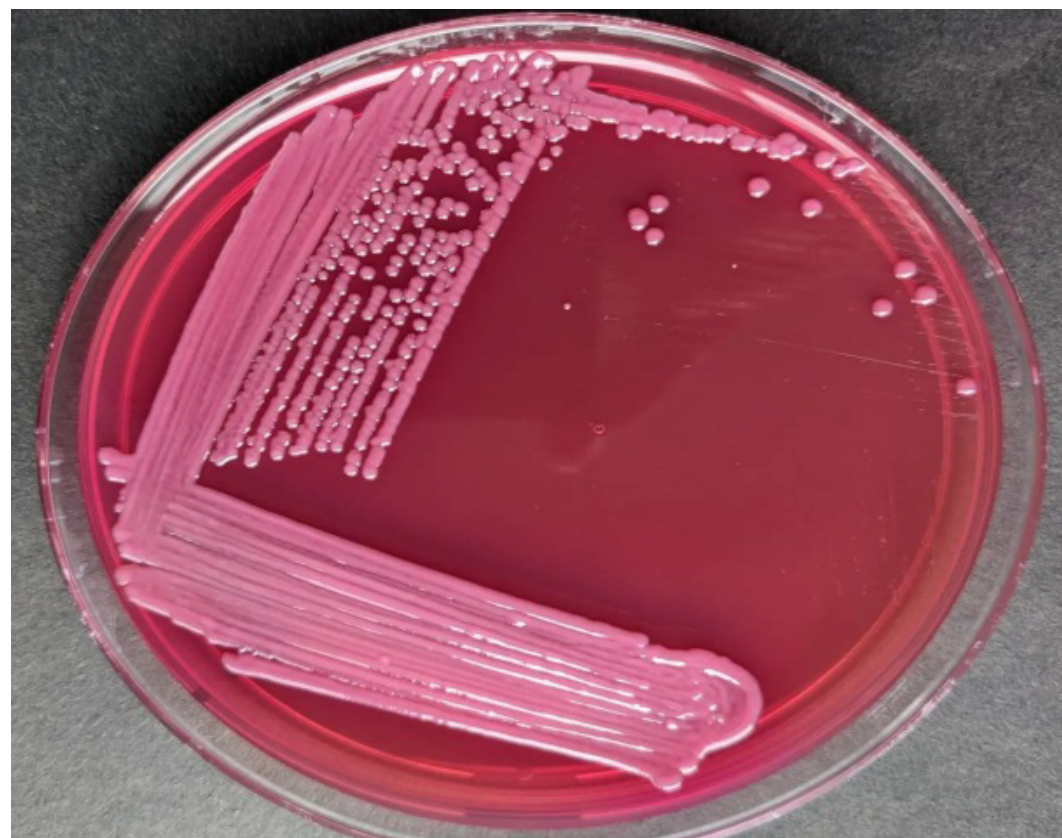
- ▶ *After autoclaving, allow the medium to cool to around 45-50° C (but not solidified). Pour the agar into sterile Petri dishes to a depth of about 4-5 mm.*

Solidification:

- ▶ *Allow the plates to solidify by leaving them at room temperature. Avoid moving or disturbing the plates during this time to prevent uneven agar distribution.*

Storage:

- ▶ *Once solidified, store the plates inverted in a refrigerator at 2-8° C until ready to use. Properly labeled plates should be used within their expiration date.*



Figure(4);macconkey agar

7.BLOOD AGAR;

Ingredients:

- ✓ Peptone
- ✓ Lactose
- ✓ Bile salts
- ✓ Neutral red
- ✓ Crystal violet
- ✓ Agar

Preparation:

- ▶ *Dissolve the appropriate amounts of peptone, lactose, bile salts, and agar in distilled water according to the manufacturer's instructions or the recipe you are following.*
- ▶ *Adjust the pH of the solution to around 7.1-7.5 using either hydrochloric acid (HCl) or sodium hydroxide (NaOH).*
- ▶ *Heat the mixture gently to dissolve all components completely.*
- ▶ *Add neutral red and crystal violet to the solution. These dyes act as indicators for lactose fermentation and inhibit the growth of gram-positive bacteria, respectively.*
- ▶ *Mix thoroughly to ensure uniform distribution of components.*
- ▶ *Dispense the medium into tubes or plates and autoclave at 121° C for 15 minutes to sterilize.*

Storage:

- ▶ *Store the prepared agar plates or tubes in a cool, dry place away from direct light. Properly sealed plates can typically be stored for several weeks to months.*
- ▶ *Quality Control:*
 - ▶ *Ensure that the pH of the medium is within the acceptable range.*
 - ▶ *Check for any signs of contamination before use.*
 - ▶ *Perform appropriate positive and negative control tests to verify the medium's performance.*

Usage:

- ▶ *Inoculate the MacConkey Agar with the bacterial culture using a sterile inoculating loop.*
- ▶ *Incubate the plates or tubes aerobically at 35-37° C for 18-24 hours.*
- ▶ *After incubation, observe the growth and color change of the medium. Interpret the results based on the characteristic reactions of different bacteria on MacConkey Agar*



Figure(5);blood agar

8.AGAR AGAR;

Ingredients:

- ✓ *Trypticase soy agar base (TSA)*
- ✓ *Sheep blood (typically 5-10% concentration)*
- ✓ *Agar*

Preparation:

- ▶ *Prepare Trypticase soy agar (TSA) base according to the manufacturer's instructions or the recipe you are following.*
- ▶ *Sterilize the TSA base by autoclaving at 121° C for 15 minutes.*
- ▶ *Allow the TSA base to cool to approximately 50-55° C, but not solidify.*

- ▶ *Aseptically add sterile defibrinated sheep blood to the melted TSA base. The concentration of blood typically ranges from 5-10%.*
- ▶ *Mix the blood and TSA base thoroughly to ensure uniform distribution.*
- ▶ *Pour the mixture into petri dishes or tubes to solidify.*

Storage:

- ▶ *Store the prepared Blood Agar plates in a cool, dark place, typically at 2-8° C. Properly sealed plates can typically be stored for several weeks.*
- ▶ *Quality Control:*
 - ▶ *Ensure that the pH of the medium is within the acceptable range.*
 - ▶ *Check for any signs of contamination before use.*
 - ▶ *Perform appropriate positive and negative control tests to verify the medium's performance.*

Usage:

- ▶ *Inoculate the Blood Agar plates with the bacterial culture using a sterile inoculating loop or swab.*
- ▶ *Incubate the plates aerobically or anaerobically, as appropriate for the microorganisms being tested, at the recommended temperature (usually 35-37° C) for the specified incubation period (typically 18-24 hours).*
- ▶ *After incubation, observe the growth and hemolytic patterns on the Blood Agar plates.*
- ▶ *Interpretation of results typically involves observing the types of hemolysis exhibited by bacterial colonies:*
 - ▶ *Alpha-hemolysis: Partial destruction of red blood cells, resulting in a greenish discoloration around the colonies.*

- ▶ *Beta-hemolysis: Complete destruction of red blood cells, resulting in a clear zone around the colonies.*
- ▶ *Gamma-hemolysis: No hemolysis, and no change in the appearance of the agar around the colonies*

9.SALMONELLA SHIGELLA;

Ingredients:

- ✓ *Peptone*
- ✓ *Lactose*
- ✓ *Sodium chloride*
- ✓ *Bile salts*
- ✓ *Neutral red*
- ✓ *Sodium thiosulfate*
- ✓ *Ferric citrate*
- ✓ *Agar*

Preparation:

- ▶ *Dissolve the appropriate amounts of peptone, lactose, sodium chloride, bile salts, sodium thiosulfate, and ferric citrate in distilled water according to the manufacturer's instructions or the recipe you are following.*
- ▶ *Adjust the pH of the solution to around 7.0-7.4 using either hydrochloric acid (HCl) or sodium hydroxide (NaOH).*
- ▶ *Heat the mixture gently to dissolve all components completely.*
- ▶ *Add agar to the solution to solidify it.*
- ▶ *Mix thoroughly to ensure uniform distribution of components.*
- ▶ *Dispense the medium into tubes or plates and autoclave at 121° C for 15 minutes to sterilize.*

Storage:

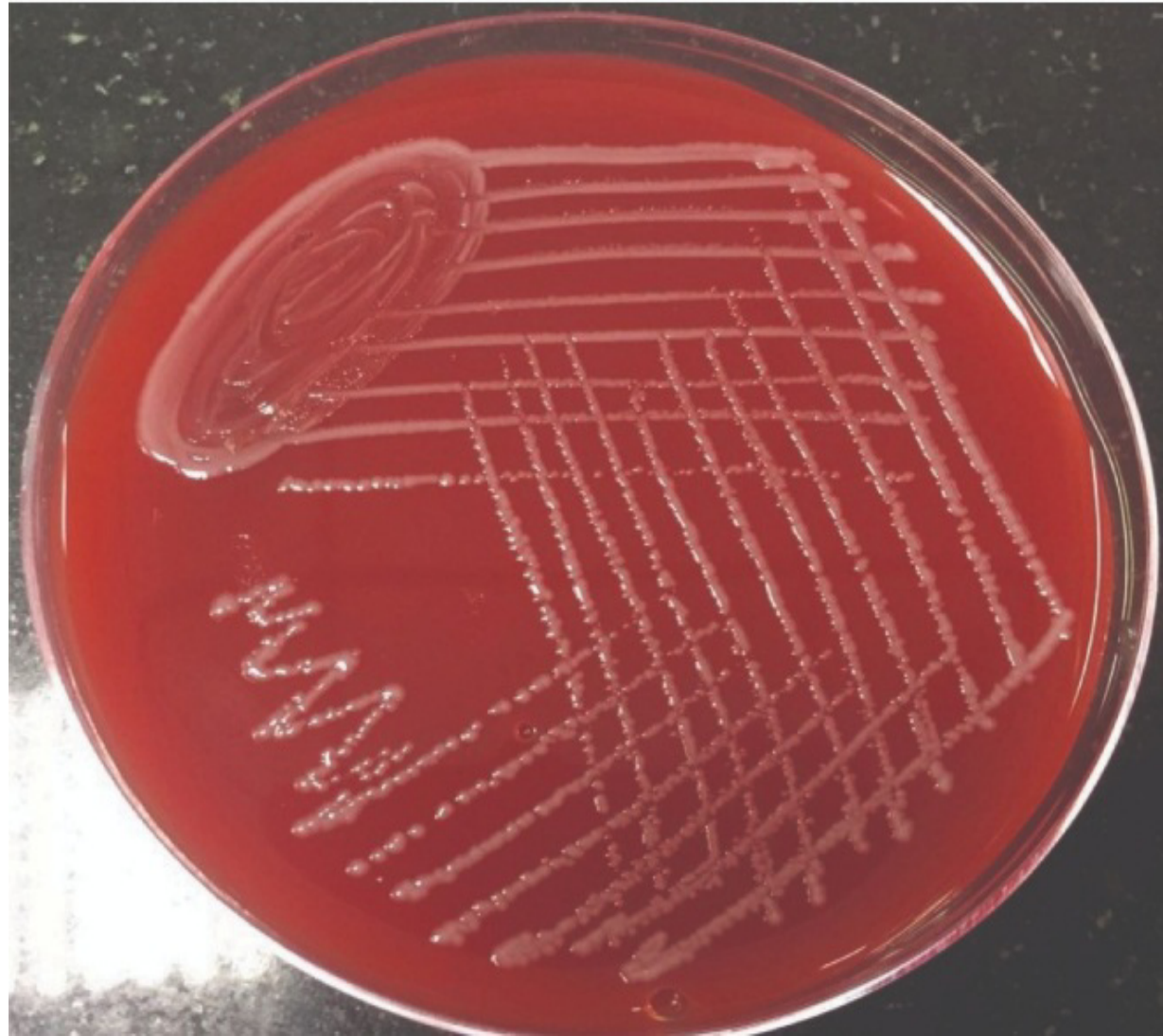
- ▶ *Store the prepared agar plates or tubes in a cool, dry place away from direct light. Properly sealed plates can typically be stored for several weeks to months.*

Quality Control:

- ▶ *Ensure that the pH of the medium is within the acceptable range.*
- ▶ *Check for any signs of contamination before use.*
- ▶ *Perform appropriate positive and negative control tests to verify the medium's performance.*

Usage:

- ▶ *Inoculate the Salmonella Shigella Agar with the bacterial culture using a sterile inoculating loop.*
- ▶ *Incubate the plates or tubes aerobically at 35-37° C for 18-24 hours.*
- ▶ *After incubation, observe the growth and colony characteristics on the medium. Interpret the results based on the characteristic reactions of Salmonella and Shigella species on Salmonella Shigella Agar.*
- ▶ *Interpretation of results typically involves observing the following:*
 - ▶ *Salmonella colonies: Appear as colorless or translucent colonies with a black center due to hydrogen sulfide production.*
 - ▶ *Shigella colonies: Appear as colorless or translucent colonies without black centers.*
 - ▶ *Lactose-fermenting organisms: Produce pink colonies.*
 - ▶ *Non-lactose fermenters: Produce colorless colonies.*



Figure(6);salmonella shigella

10.XLD;

Ingredients:

- ✓ Peptone
- ✓ Yeast extract
- ✓ Lysine
- ✓ Xylose
- ✓ Lactose
- ✓ Sucrose
- ✓ Sodium chloride
- ✓ Sodium thiosulfate
- ✓ Ferric ammonium citrate
- ✓ Phenol red
- ✓ Deoxycholate
- ✓ Agar

Preparation:

- ▶ Dissolve the appropriate amounts of peptone, yeast extract, lysine, xylose, lactose, sucrose, sodium chloride, sodium thiosulfate, ferric ammonium citrate, and phenol red in distilled water according to the manufacturer's instructions or the recipe you are following.
- ▶ Adjust the pH of the solution to around 7.2-7.4 using either hydrochloric acid (HCl) or sodium hydroxide (NaOH).
- ▶ Heat the mixture gently to dissolve all components completely.
- ▶ Add deoxycholate to the solution for selective inhibition of gram-positive bacteria.
- ▶ Add agar to the solution to solidify it.
- ▶ Mix thoroughly to ensure uniform distribution of components.
- ▶ Dispense the medium into tubes or plates and autoclave at 121° C for 15 minutes to sterilize.

Storage:

- ▶ Store the prepared agar plates or tubes in a cool, dry place away from direct light. Properly sealed plates can typically be stored for several weeks to months.

Quality Control:

- ▶ Ensure that the pH of the medium is within the acceptable range.
- ▶ Check for any signs of contamination before use.
- ▶ Perform appropriate positive and negative control tests to verify the medium's performance.

Usage:

- ▶ Inoculate the XLD Agar with the bacterial culture using a sterile inoculating loop.
- ▶ Incubate the plates or tubes aerobically at 35-37° C for 18-24 hours.

- ▶ *After incubation, observe the growth and colony characteristics on the medium. Interpret the results based on the characteristic reactions of Salmonella and Shigella species on XLD Agar.*
- ▶ *Interpretation of results typically involves observing the following:*
- ▶ *Salmonella colonies: Appear as red colonies with black centers due to hydrogen sulfide production and acid production from xylose fermentation.*
- ▶ *Shigella colonies: Appear as pink colonies with no black centers.*
- ▶ *Non-lactose fermenters: Produce colorless colonies.*
- ▶ *Lactose fermenters: Produce yellow colonies.*



Figure(7);XLD AGAR

11.AUTOCLAVE

Loading;

- ▶ *Items to be sterilized are loaded into the autoclave chamber. It's essential to arrange items properly to allow steam to penetrate and ensure effective sterilization.*

Adding Water:

- ▶ *Distilled water is added to the autoclave's reservoir. This water will generate steam during the sterilization process.*

Setting Parameters:

- ▶ *The operator sets the desired parameters for sterilization, including temperature, pressure, and duration. Standard conditions for autoclaving are typically around 121° C (250° F) at 15 psi (pounds per square inch) for 15-30 minutes, but specific settings may vary depending on the items being sterilized.*

Start:

- ▶ *Once the parameters are set, the autoclave is started. The chamber is sealed, and the air inside is removed through a vacuum or displacement process to ensure efficient steam penetration.*

Sterilization:

- ▶ *The autoclave heats the water in the chamber to produce steam. As the temperature and pressure rise to the set parameters, steam circulates around the items, effectively killing microorganisms through coagulation of proteins, denaturation of enzymes, and disruption of cell membranes.*

Cooling:

- ▶ *After the sterilization cycle is complete, the autoclave may release steam or open vents to allow the chamber to cool down. Rapid cooling may be facilitated by a fan or other cooling mechanisms to prevent condensation on sterilized items.*

Cycle Completion:

- ▶ *Once the chamber has cooled to a safe temperature, the autoclave indicates that the sterilization cycle is complete, and the chamber can be opened safely.*

Unloading;

- ▶ *Sterilized items are carefully removed from the autoclave chamber using proper personal protective equipment (PPE) and handling techniques to prevent recontamination.*

Quality Control:

- ▶ *Regular monitoring and validation of autoclave performance are essential to ensure that sterilization cycles are effective. This may involve biological indicators, chemical indicators, and routine maintenance and calibration of the autoclave.*

Documentation:

- ▶ *Proper documentation of sterilization cycles, including cycle parameters, load contents, and any deviations or maintenance activities, is necessary to maintain compliance with regulatory requirements and quality standards.*



Figure(8);Autoclave

12.SLAND PREPARATION

Planning and Design:

- *Before setting up islands, it's crucial to plan and design the layout of the laboratory space. This involves considering factors such as workflow, equipment placement, accessibility, and safety regulations.*

Identifying Work Areas:

- *Determine the specific tasks or analyses that will be performed in the laboratory. Each task may require its own designated area or island, depending on the requirements for cleanliness, equipment usage, and potential contamination risks.*

Allocating Space:

- ▶ *Allocate appropriate space for each island based on the requirements of the tasks to be performed. Ensure that there is enough room for personnel to work comfortably and safely without crowding.*

Installing Equipment:

- ▶ *Set up the necessary equipment and instruments at each island according to the designated tasks. This may include microscopes, centrifuges, analyzers, and other specialized laboratory apparatus.*

Organizing Supplies:

- ▶ *Stock each island with the required supplies, reagents, consumables, and disposables needed for the designated tasks. Keep these items organized and easily accessible to facilitate smooth workflow and minimize downtime.*

Implementing Safety Measures:

- ▶ *Ensure that safety measures are in place at each island to protect laboratory personnel and maintain compliance with safety regulations. This may include providing personal protective equipment (PPE), implementing hazard communication protocols, and installing safety devices on equipment.*

Creating Work Instructions;

- ▶ *Develop clear and concise work instructions or protocols for each island to guide laboratory personnel in performing their tasks efficiently and accurately. These instructions should include procedures for sample preparation, analysis, data recording, and equipment maintenance.*

Routine Maintenance:

- *Establish a schedule for routine maintenance and cleaning of each island to ensure that equipment remains in good working condition and that workspaces are kept clean and free from contamination.*

Quality Control:

- *Implement quality control measures to monitor the performance of laboratory processes and ensure the accuracy and reliability of test results generated at each island.*



Figure(9);slant preparation

13.STREAKING

Preparation:

- *Before streaking, ensure that all materials are sterile, including the petri dishes, inoculating loop, and any media being used. Also, ensure that the bacterial culture to be streaked is well mixed and in a liquid or semi-solid state.*

Inoculation:

- *Use a sterile inoculating loop or needle to obtain a small sample of the bacterial culture. It's essential to flame sterilize the loop or needle before and after each use to prevent contamination.*

Streaking:

- *Open the petri dish containing the solid agar medium (such as nutrient agar or selective agar) that will support bacterial growth. Using the inoculating loop, streak*

the bacterial sample onto the surface of the agar in a zigzag pattern across one section of the plate.

Dilution:

- ▶ *After streaking, flame sterilize the loop and then streak the loop through the first streaked area (the primary streak) and drag it out into the second section of the plate. This action dilutes the bacterial sample on the loop, resulting in fewer bacteria being deposited in subsequent sections.*

Repetition:

- ▶ *Repeat the dilution and streaking process multiple times, moving from one section of the plate to another with each streak. With each streaking motion, bacteria are further diluted and spread out on the agar surface.*

14.SAFETY MEASURES

Personal Protective Equipment (PPE):

- ▶ *Wear appropriate PPE such as lab coats, gloves, safety goggles, and face masks to protect against chemical splashes, biohazards, and airborne contaminants.*

Hand Hygiene:

- ▶ *Wash hands thoroughly with soap and water before and after handling specimens, after removing gloves, and whenever hands are visibly soiled. Use alcohol-based hand sanitizers when hand washing facilities are not readily available.*

Safe Handling of Specimens:

- ▶ *Handle all specimens with caution and assume they are potentially infectious. Use biohazard bags or containers for transporting and disposing of biological materials appropriately.*

Safe Chemical Handling:

- ▶ *Read and understand Safety Data Sheets (SDS) for all chemicals used in the laboratory. Follow proper procedures for storing, handling, and disposing of chemicals. Use fume hoods when working with volatile or hazardous chemicals.*

Equipment Safety:

- ▶ *Ensure that laboratory equipment is properly maintained, calibrated, and used according to manufacturer instructions. Follow safety protocols when operating equipment such as centrifuges, autoclaves, and microscopes.*

Biohazard Safety:

- ▶ *Label all biohazardous materials and waste containers appropriately. Use biological safety cabinets (BSCs) or other containment devices when working with infectious agents to minimize exposure risks.*

Spill Management:

- ▶ *Have spill kits readily available in the laboratory for handling chemical spills, biohazardous spills, or other emergencies. Follow established protocols for cleaning up spills and decontaminating affected areas.*

Emergency Procedures:

- ▶ Familiarize yourself with emergency procedures, including evacuation routes, fire extinguisher locations, and first aid measures. Know how to respond to emergencies such as fires, chemical spills, or injuries.

Training and Education:

- ▶ Provide comprehensive safety training to laboratory personnel on handling hazardous materials, using safety equipment, and following standard operating procedures (SOPs). Ensure ongoing education and reinforcement of safety protocols.

Documentation and Reporting:

- ▶ Maintain accurate records of safety inspections, incidents, and training sessions. Report any safety concerns, near misses, or accidents to the appropriate personnel or safety officer for investigation and resolution

15. HEMATOLOGY

In this department of lab I learnt about the test related to blood like blood Smear, cell count.

16. BLOOD SMEAR;

Preparation of Blood Sample:

- ▶ Collect a blood sample from the patient using venipuncture or finger prick method.
- ▶ Transfer a small drop of blood onto a clean glass slide. It's important to handle the blood sample gently to prevent cell damage.
- ▶ Spreading the Blood:

- ▶ *Use another clean glass slide, held at a 30-45 degree angle, to spread the blood drop across the surface of the slide. This process is called “feathering” or “smearing.”*
- ▶ *The blood should spread evenly in a thin layer across the slide, without clumping or streaks. Properly spreading the blood ensures an even distribution of cells for microscopic examination.*

Air Drying:

- ▶ *Allow the blood smear to air dry completely at room temperature. Air drying prevents distortion of cell morphology and facilitates staining.*

Fixation:

- ▶ *Optionally, the blood smear may be fixed with a fixative solution (such as methanol or ethanol) to preserve the cellular structure before staining. Fixation helps prevent cell lysis and distortion during staining.*

Staining:

- ▶ *Once the blood smear is dry, it's stained using Romanowsky stains, such as Wright's stain or Giemsa stain. These stains highlight the various blood cell components and allow for better visualization under the microscope.*
- ▶ *Staining protocols may vary depending on the laboratory and the specific staining technique used.*

Microscopic Examination:

- ▶ *Examine the stained blood smear under a microscope using oil immersion at high magnification (typically 100x). Evaluate the morphology, size, shape, and distribution of blood cells, including red blood cells (erythrocytes), white blood cells (leukocytes), and platelets (thrombocytes).*

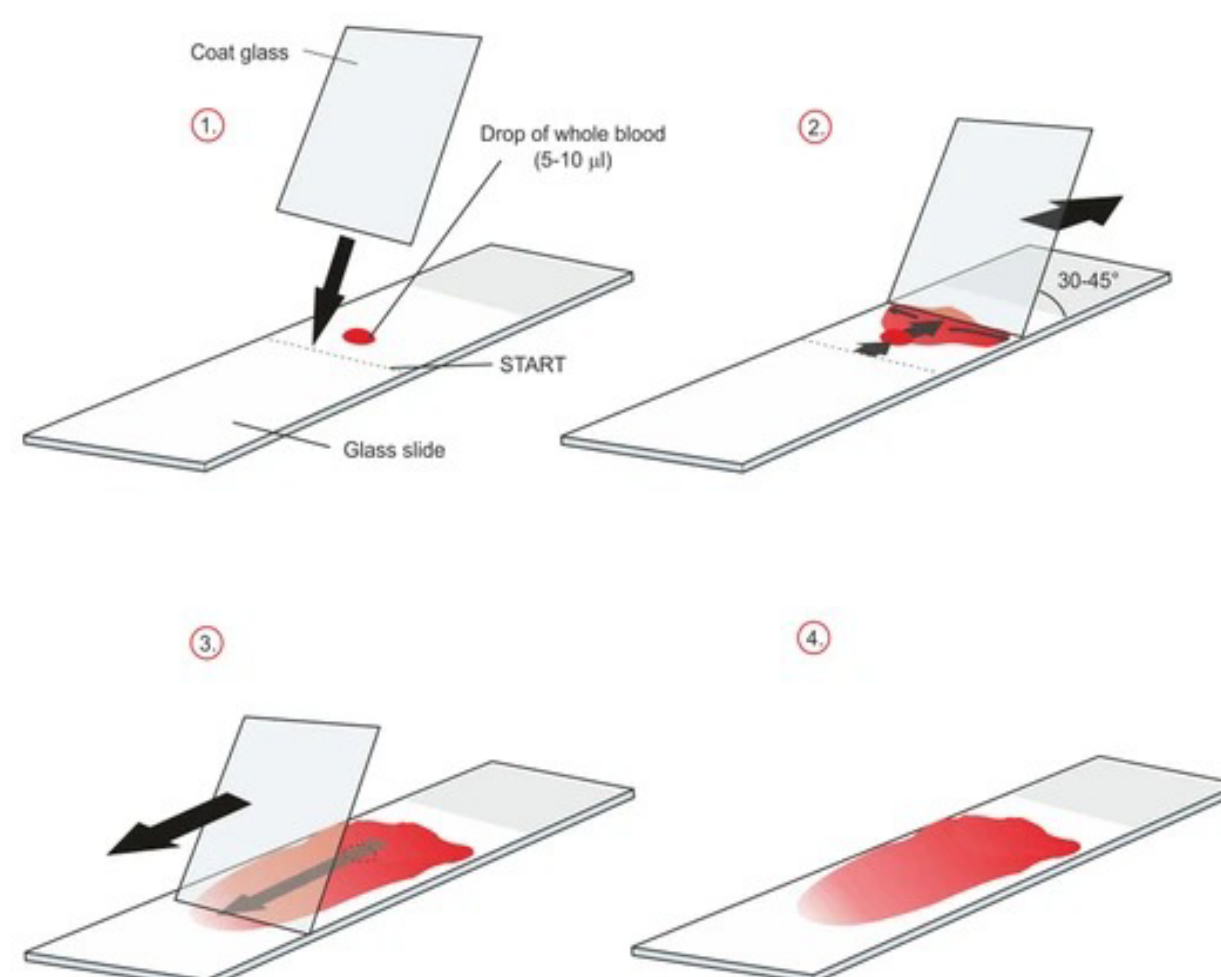
- ▶ *Identify and count different types of blood cells, including neutrophils, lymphocytes, monocytes, eosinophils, and basophils.*
- ▶ *Look for abnormalities such as immature cells, abnormal cell shapes, inclusion bodies, and parasite presence (such as malaria parasites).*

Interpretation and Reporting:

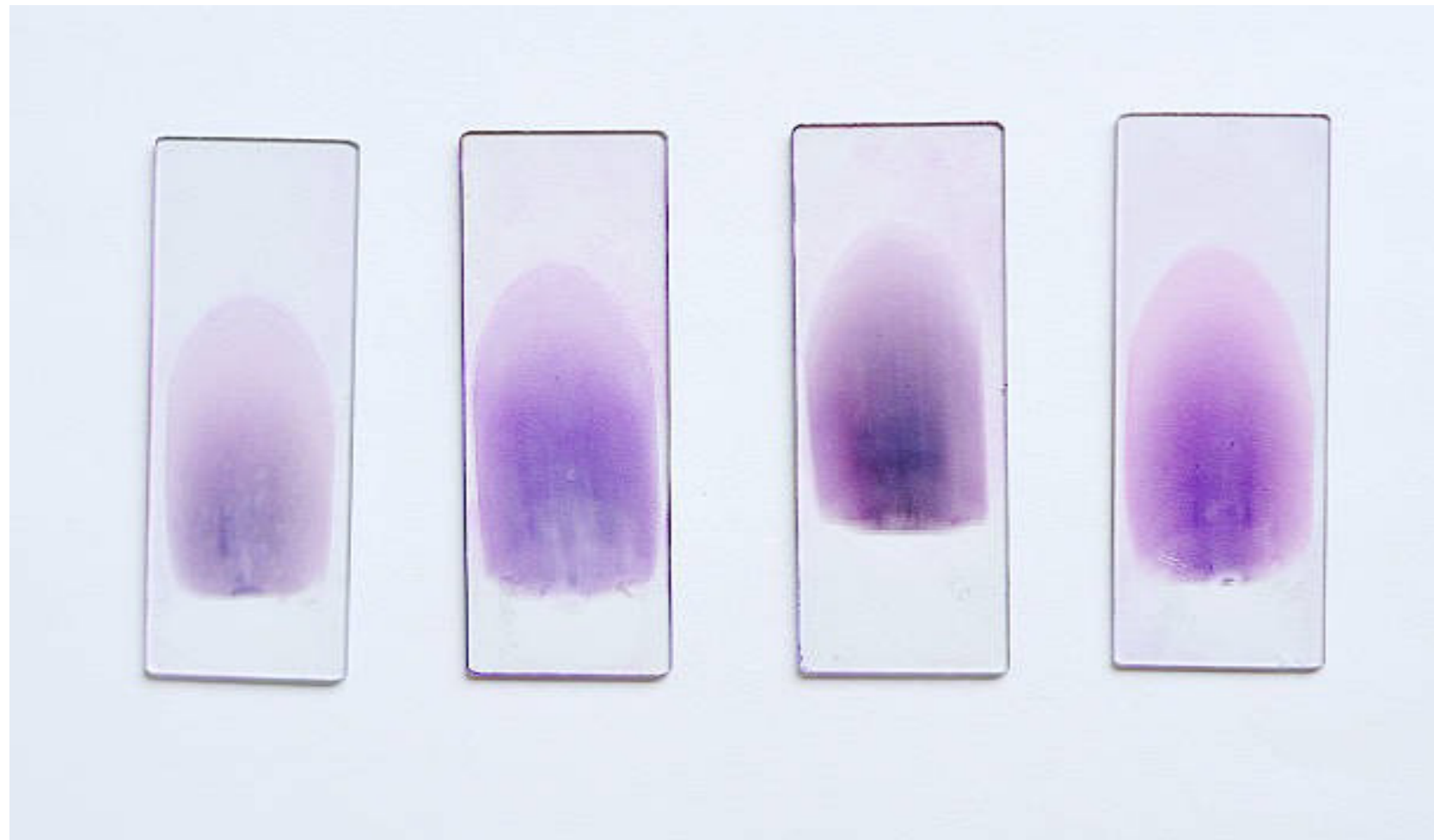
- ▶ *Interpret the findings based on the observed morphology and distribution of blood cells. Document any abnormalities or significant findings in the laboratory report.*
- ▶ *Blood smear examination can aid in the diagnosis of various conditions, including anemia, infections, leukemia, thrombocytopenia, and other hematologic disorders.*

Quality Control:

- ▶ *Perform regular quality control checks to ensure the accuracy and reliability of blood smear preparation and staining techniques.*
- ▶ *Monitor staining procedures, slide preparation techniques, and microscopic examination practices to maintain high-quality standards in the laboratory*



Figure(10);blood sear



Figure(11);gram staining

17.CELL COUNT;

Preparation of Hemocytometer:

- ▶ *Clean the hemocytometer, a specialized glass slide with a grid pattern, to ensure it is free of any debris or residues. Sterilize if necessary.*
- ▶ *Prepare a dilution of the sample using an appropriate diluent solution (e.g., isotonic saline, phosphate-buffered saline). The dilution factor should be chosen to achieve a suitable cell concentration for counting.*

Loading the Hemocytometer:

- ▶ *Place a small volume of the diluted sample into the chamber of the hemocytometer using a pipette. Fill the chamber completely without overflowing, and ensure the sample is evenly distributed across the grid squares.*
- ▶ *Allowing Cells to Settle:*

- ▶ Allow the cells to settle within the counting chamber for a specific period (usually 5-10 minutes) to facilitate an even distribution across the grid squares. Avoid disturbing the chamber during this time to prevent cell displacement.

Microscopic Examination:

- ▶ Place the hemocytometer under a microscope with appropriate magnification (typically 10x or 20x objective).
- ▶ Focus on the grid pattern of the hemocytometer, ensuring clear visualization of the grid lines and cells within the squares.

Counting Cells:

- ▶ Count the cells within the grid squares according to a standardized counting scheme. Different cell types may require specific counting rules based on their morphology and staining properties.
- ▶ Use a mechanical or digital tally counter to keep track of the number of cells counted. Avoid double-counting cells and ensure consistent counting throughout the grid.

Calculating Cell Count:

- ▶ Calculate the total number of cells per unit volume of the original sample using the formula provided by the manufacturer of the hemocytometer. This formula takes into account the dilution factor, grid area, and depth of the counting chamber.

Data Analysis and Interpretation:

- ▶ Analyze the cell count data obtained and interpret the results in the context of the patient's clinical condition, relevant reference ranges, and any other laboratory findings.
- ▶ Document the cell count results accurately in the laboratory report, including the counting method used, dilution factors, and any relevant notes or observations.



Figure(12);cbc machine

18.CLINICAL PATHALOGY

In this session I gained knowledge about procedures for urine routine.

► *Urin analysis*

19.URIN ANALYSIS;

Sample Collection:

- *Collect a fresh urine sample from the patient using a clean, sterile container.*
Midstream urine collection is preferred to minimize contamination from the urethra.

Physical Examination:

- *Perform a visual inspection of the urine sample for color, clarity, and odor. Normal urine is typically pale yellow to amber in color, clear or slightly cloudy, and has a mild odor.*

Chemical Analysis:

- ▶ *Use chemical reagent strips (urine dipsticks) to test for various substances in the urine, including pH, specific gravity, protein, glucose, ketones, bilirubin, urobilinogen, nitrites, and leukocyte esterase.*
- ▶ *Dip the reagent strip into the urine sample and compare the color changes on the strip to a color chart provided by the manufacturer to interpret the results.*

Microscopic Examination:



Figure(13);urin strip

- ▶ *Centrifuge a portion of the urine sample to sediment any particulate matter, such as cells, casts, crystals, or bacteria.*
- ▶ *Examine the sediment under a microscope at low and high magnification to identify and quantify the different components present, including red blood cells (RBCs), white blood cells (WBCs), epithelial cells, casts, crystals, and microorganisms.*
- ▶ *Perform a manual cell count if necessary to quantify the number of cells present in the urine sediment.*

Interpretation and Reporting:

- ▶ *Interpret the urinalysis findings based on the results of the physical examination, chemical analysis, and microscopic examination.*
- ▶ *Document any abnormal findings, such as abnormal color, turbidity, presence of blood, proteinuria, glycosuria, ketonuria, bilirubinuria, leukocyturia, hematuria, pyuria, or the presence of abnormal cells or structures in the urine sediment.*
- ▶ *Correlate the urinalysis results with the patient's clinical history, symptoms, and other laboratory tests to aid in diagnosis and patient management.*

Quality Control:

- ▶ *Perform regular quality control checks on reagent strips, equipment, and procedures to ensure the accuracy and reliability of urinalysis results.*
- ▶ *Monitor and document quality control data to identify and correct any issues or deviations that may affect the integrity of the test results.*

20.SEROLOGY

In this department of lab I learnt about all the tests related to sandwich elisa, SDS page

21.SANDWITCH ELISA;

Principle:

- ▶ *The sandwich ELISA is based on the principle of antigen-antibody binding, where the target molecule (antigen) is captured between two specific antibodies (hence the term "sandwich") that recognize different epitopes on the antigen molecule.*

Coating the Plate:

- ▶ A microplate (usually a 96-well plate) is coated with a capture antibody that specifically binds to the target antigen. The plate is typically coated with the capture antibody by incubating it with a solution containing the antibody.

Blocking:

- ▶ After coating, the plate is washed to remove any unbound capture antibody and then blocked with a blocking buffer (e.g., bovine serum albumin or milk) to prevent non-specific binding of other proteins to the plate surface.

Sample Incubation:

- ▶ The biological sample containing the target antigen is added to the coated and blocked plate and incubated for a specific period. During this incubation, the target antigen binds to the immobilized capture antibody.

Washing:

- ▶ After sample incubation, the plate is washed multiple times to remove any unbound sample components, debris, or non-specific interactions.

Detection Antibody Addition:

- ▶ A detection antibody, which recognizes a different epitope on the target antigen, is added to the plate and allowed to bind to the captured antigen. This detection antibody is typically conjugated to an enzyme (e.g., horseradish peroxidase, alkaline phosphatase) that catalyzes a colorimetric or chemiluminescent reaction.

Washing:

- ▶ The plate is washed again to remove any unbound detection antibody.

Substrate Addition:

- ▶ *A substrate solution containing a chromogenic or chemiluminescent substrate specific to the enzyme conjugated to the detection antibody is added to the plate. The enzyme catalyzes a reaction with the substrate, resulting in a color change or luminescent signal that is proportional to the amount of bound antigen.*

Signal Detection:

- ▶ *The color change or luminescent signal is measured using a microplate reader. The intensity of the signal is directly proportional to the concentration of the target antigen in the sample.*

Data Analysis:

- ▶ *The data obtained from the microplate reader are analyzed using appropriate software to calculate the concentration of the target antigen in the sample based on a standard curve generated from known concentrations of a reference antigen.*

22.SDS PAGE;

Sample Preparation:

- ▶ *Protein samples are prepared by solubilizing them in a denaturing buffer containing SDS (sodium dodecyl sulfate) and a reducing agent (such as beta-mercaptoethanol or dithiothreitol). SDS denatures proteins by disrupting non-covalent interactions and conferring a negative charge, while the reducing agent breaks disulfide bonds.*

- ▶ *Samples may be heated to further denature the proteins and ensure uniform binding of SDS.*

Gel Preparation:

- ▶ *SDS-PAGE gels are composed of a resolving gel and a stacking gel. The resolving gel typically has a higher acrylamide concentration and separates proteins based on size, while the stacking gel concentrates the protein bands into a sharp zone before they enter the resolving gel.*
- ▶ *The gel components (acrylamide, bis-acrylamide, buffer, initiator, and SDS) are mixed and poured between glass plates, forming a gel slab.*

Sample Loading:

- ▶ *Protein samples, along with a molecular weight marker, are loaded into wells at the top of the gel using a micropipette. The molecular weight marker consists of known proteins of different sizes, serving as a reference for estimating the molecular weight of unknown proteins.*
- ▶ *Electrophoresis:*
- ▶ *The gel assembly is placed in an electrophoresis chamber filled with running buffer, and an electric current is applied. The negatively charged SDS-bound proteins migrate through the gel matrix towards the positively charged electrode at the bottom of the gel.*
- ▶ *Proteins separate according to their molecular weight, with smaller proteins migrating faster and larger proteins migrating more slowly through the gel.*

Staining:

- ▶ *After electrophoresis, the separated proteins are visualized by staining the gel with a protein stain, such as Coomassie Brilliant Blue or silver stain. The stain binds to the proteins, making them visible as bands against the background of the gel.*

- ▶ *Destaining and Imaging:*
- ▶ *Excess stain is removed by washing the gel with a destaining solution, and the gel is then imaged using a gel documentation system or scanner.*
- ▶ *The protein bands are analyzed based on their migration distance (relative mobility) and compared to the molecular weight marker to estimate the molecular weight of the proteins.*

Data Analysis:

- ▶ *The intensity and position of protein bands are analyzed using image analysis software. Quantitative data, such as band intensity or relative abundance, can be obtained for further analysis.*



Figure(14);SDS PAGE

23.BLOOD BANKING;

24.INTRODUCTION

Blood banking is the process that takes place in the lab to make sure that donated blood, or blood products, are safe before they are used in blood transfusions and other medical procedures. Blood banking includes typing the blood for transfusion and testing for infectious diseases.

- ✓ *About 36,000 units of blood are needed every day.*
- ✓ *The number of blood units donated is about 13.6 million a year.*
- ✓ *About 6.8 million volunteers are blood donors each year.*
- ✓ *Each unit of blood is broken down into components, such as red blood cells,*
- ✓ *plasma, cryo precipitated AHF, and platelets. One unit of whole blood, once*
- ✓ *it's separated, may be transfused to several patients, each with different needs.*
- ✓ *Annually, more than 21 million blood components are transfused.*
- ✓ *Must be at least 16 years of age, or in accordance with state law*
- ✓ *Must be in good health*
- ✓ *Must weigh at least 110 pounds*
- ✓ *Must pass the physical and health history exam given before donation*

Some states permit people younger than 16 or 17 years to donate blood, with parental consent.

- ✓ *Blood donation is a vital part of worldwide healthcare. It allows for blood transfusion as a life-sustaining and life-saving procedure. Over one hundred million units of blood are donated each year throughout the world. This activity reviews donor eligibility and selection, adverse effects of donation, and pathogen reduction and inactivation for donated blood. This activity highlights the role of the interprofessional team in ensuring appropriate protocol is followed.*

25.DONOR SELECTION CRITERIA

Who are Eligible to Donate Blood?

Any healthy adult, both male and female, can donate every three months

Good health of the donor must be fully ensured. The universally accepted criteria for donor selection are:

- ✓ *Age between 18 and 60 years*
- ✓ *Haemoglobin - not less than 12.5 g/Dl*
- ✓ *Pulse - between 50 and 100/minute with no irregularities Blood Pressure*
-Systolic 100-180 mm Hg and Diastolic 50 - 100 mm Hg
- ✓ *Temperature - Normal (oral temperature not exceeding 37.50C)*
- ✓ *Body weight - not less than 45 Kg*

- ✓ *Health conditions: The donor should be in a healthy state of mind and body.*

- ✓ *They should fulfill the following criteria:*

- ✓ *Past one year - not been treated for Rabies or received Hepatitis B immune globulin.*
- ✓ *Past six months - not had a tattoo, ear or skin piercing or acupuncture, not received blood or blood products, no serious illness or major surgery, no contact with a person with hepatitis or yellow jaundice.*
- ✓ *Past three months - not donated blood or been treated for Malaria.*
- ✓ *Past one month - had any immunizations.*
- ✓ *5. Past 48 hours - taken any antibiotics or any other medications (Allopathic or Ayurveda or Sidha or Homeo)*
- ✓ *Past 24 hours - taken alcoholic beverages*
- ✓ *Past 72 hours - had dental work or taken Aspirin*
- ✓ *Present - not suffering from cough, influenza or sore throat, common cold*

- ✓ *Women should not be pregnant or breast feeding her child*
- ✓ *Women donor should not donate during her menstrual cycles*
- ✓ *Free from Diabetes, not suffering from chest pain, heart disease or high BP, cancer, blood clotting problem or blood disease, unexplained fever, weight loss, fatigue, night sweats, enlarged lymph nodes in armpits, neck or groin, white patches in the mouth etc.*
- ✓ *Ever had TB, bronchial asthma or allergic disorder, liver disease, kidney disease, fits or fainting, blue or purple spots on the skin or mucous membranes, received human pituitary - growth hormones etc*

26. REJECTION CRITERIA

- ✓ *Affected with HIV viruses or AIDS*
- ✓ *If the patient had undergone any open heart surgery*
- ✓ *Pregnant lady*
- ✓ *Cancer patient*
- ✓ *Kidney disorder or Diabetes patient*
- ✓ *T' B patient are not eligible*
- ✓ *Have asthma with active symptoms, and severe asthma patients*
- ✓ *High blood pressure*
- ✓ *Organ transplantation*
- ✓ *Unexpected weight loss of more than 5 kg over 6 months*
- ✓ *Put the tattoo*
- ✓ *Cannot donate the blood in alcoholic person*
- ✓ *Should not donate the blood in smoker*
- ✓ *Affected with jaundice patient*

27. BLOOD DONOR REQUEST FORM

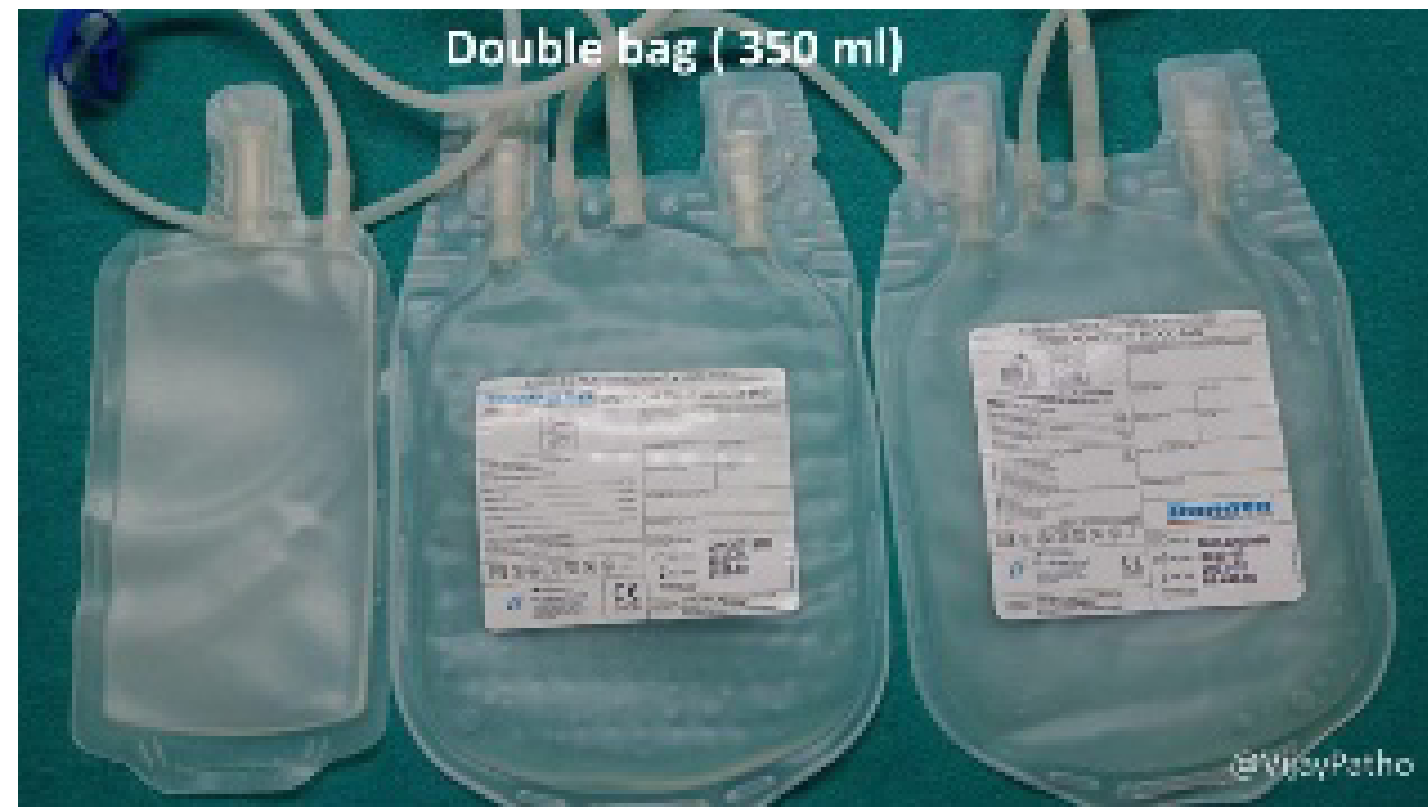
- ✓ *First when the donor is arrived, we should give the donor request form*
- ✓ *That request form only decides whether he can donate blood or not*

- ✓ The donor should fill the details like age, weight, hemoglobin level, name, phone number health condition.
- ✓ If he is first donor, he has any diseases or genetic problem, last time donated date address, whether he donated blood before or not
- ✓ If he is first donor, he has any disease or genetic problem, last time donated date
- ✓ If he is alcoholic or drug addict or if he uses tobacco etc... .
- ✓ The donor should fill these kind of question and put his signature

The doctor will see if he is eligible by the form then only the donor is allowed to donate blood.

28. BLOOD BAG

- ✓ Blood bags are used for the reliable collection, separation, storage and transport of blood. Rounded blood bag design prevents blood coagulation and ensures the blood and anti-coagulants are properly mixed during separation and transfusion.
- ✓ Blood bag contains some liquid like chemical called sagam which helps as anticoagulant
- ✓ Sagam A has 45 days life time and sagam B has 35 days life time.
- ✓ Citrate Phosphate Dextrose Adenine (CPDA-1) anticoagulant is present in blood bag
- ✓ It is used for transportation and transfusion of human blood and blood components.
- ✓ Blood bag stores about 350 to 450 ml of blood for that it has different types of bags
- ✓ Blood bags one of the types is double bag which helps in collecting blood and transferring the plasma.
- ✓ Blood bag has three types
- ✓ Single bag
- ✓ Double bag
- ✓ Triple bag



Figure(15);blood bag

REGISTRATION

- ✓ We' ll sign you in and go over basic eligibility.
- ✓ You' ll be asked to show ID, such as your driver' s license.
- ✓ You' ll read some information about donating blood.
- ✓ We' ll ask you for your complete address.
- ✓ Your address needs to be complete (including PO Box, street/apartment number) and the place where you will receive your mail 8 weeks from donation.

HEALTH HISTORY

- ✓ You' ll answer a few questions about your health history and places you' ve traveled, during a private and confidential interview .
- ✓ You' ll tell us about any prescription and/or over the counter medications that may be in your system.
- ✓ We' ll check your temperature, pulse, blood pressure and hemoglobin level.

PROCEDURE

- ✓ If you' re donating whole blood, we' ll cleanse an area on your arm and insert a brand new sterile needle for the blood draw . (This feels like a quick pinch and is over in seconds.)
- ✓ Other types of donations, such as platelets, are made using an apheresis machine which will be connected to both arms.

- ✓ A whole blood donation takes about 8-10 minutes, during which you' ll be seated comfortably or lying down.
- ✓ When approximately a pint of whole blood has been collected, the donation is complete and a staff person will place a bandage on your arm.
- ✓ For platelets, the apheresis machine will collect a small amount of blood, remove the platelets, and return the rest of the blood through your other arm; this cycle will be repeated several times over about 2 hours.
- ✓ REFRESHMENT AND RECOVERY
- ✓ You' ll answer a few questions about your health history and places you' ve traveled, during a private and confidential interview.
- ✓ You' ll tell us about any prescription and/or over the counter medications that may be in your system.
- ✓ We' ll check your temperature, pulse, blood pressure and hemoglobin level.

29.DONOR CONSLING

The conditions and situations where blood donor counselling is particularly important are:

First-time and young donors: to explain the blood donation process and to allay their anxiety and apprehension.

- ✓ Individuals who do not meet donor selection criteria based on the assessment of medical history and risk for TTI resulting in temporary or permanent deferral: to explain the reason for deferral
 - EX; history of cancer, multiple sexual partners and provide information on further management, as appropriate
- ✓ Individuals whose basic health check reveals a condition indicating temporary or permanent deferral: to explain the reason for deferral
 - EX; low haemoglobin level and provide information on further management, as appropriate
- ✓ Individuals who may be donating blood to seek testing for infections such as HIV: to understand their motivation for blood donation and provide information on voluntary counselling and testing services
- ✓ Donors who had experienced adverse reactions during or after donation in the past: to allay their anxiety and apprehension

- ✓ Donors who, after a previous donation, had asked for confidential unit exclusion (CUE) or informed the BTS that their blood should not be transfused: to be aware of the reason for CUE and refer for further management
- ✓ Donors who give post-donation information that warrants temporary or permanent deferral
 - EX; significant health problem developed shortly after donation): to explain the reason for deferral and provide information on further management, as appropriate
- ✓ Donors with unusual red cell serology, rare blood groups or abnormal TTI test results: to explain the importance of these results for the donor and provide information on further management



Figure(16);blood donation area

30.BLOOD GROUPING

There are 4 main groups

- ▶ A
- ▶ B
- ▶ AB
- ▶ O

There are 4 main groups defined by the ABO system;blood group A-has antigens on the red blood cells it anti-B antibodies in the plasma,blood group B-has B antigens with anti-A antibodies in the plasma,blood group O-has no antigens,but both anti- A and anti-B antibodies in the plasma

A blood typing test is used to identify your blood group.for the test,your blood sample is mixed with anti A and anti B antibodies and checked to see if the blood cells stick together

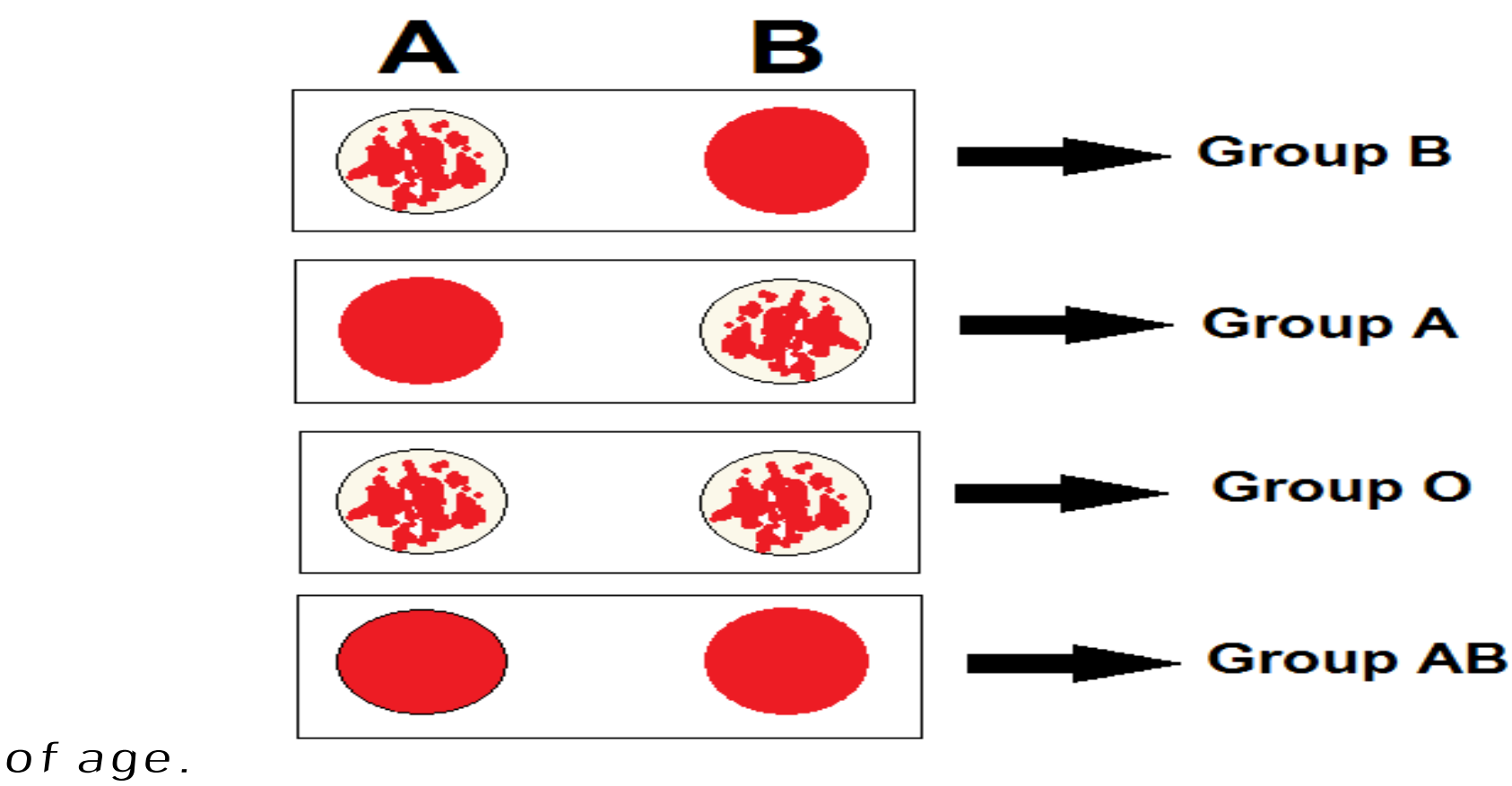
(agglutination).the serum (the liquid part of the blood without cells)is then mixed with type A and type B blood.



Figure(17);blood grouping reagent

REVERS BLOOD GROUPING

- ▶ Reverse blood grouping is a procedure to confirm ABO blood group based on the presence or absence of anti-A and anti-B in serum using known A and B red cells.
- ▶ It is cross check for forward typing. Performing both forward and reverse grouping provides a check for accuracy.
- ▶ Because of the lack of synthesized immunoglobulins, anti-A and Anti-B in newborns and very young infants ,this procedure is not performed on infants below 4 months



31.Blood screening test

Donor blood will be screened for;

- ✓ HIV
- ✓ Hepatitis B and C
- ✓ Syphilis malaria
- ✓ Malaria
- ✓ HIV
- ✓ HIV testing, also called HIV screening, is the only way to know if you have the virus.
- ✓ Several types of tests check your blood or other body fluids to see whether you're infected. Most can't
- Importance of HIV Testing
- ✓ If you have the virus, finding out quickly means you can start treatment right away so you can feel better and live a long, full life. You can also take steps so you don't pass HIV to other people.
- ✓ Importance of HIV testing
- Pregnant women should get tested because early treatment means you probably won't pass it to your baby
- spot HIV right away because it takes time for your body to make antibodies or for enough of the virus to grow inside you.

Laboratory tests.

For these tests, a technician takes a sample of your blood and tests it. You'll get results within a few days.

- ✓ Rapid tests.
- ✓ These tests provide results in about 20-30 minutes. You can get them done in a community clinic or take them at home.

HIV Testing Types;

- ✓ *Standard HIV blood test*
- ✓ *Rapid blood test*
- ✓ *Rapid oral test*
- ✓ *Urine test*
- ✓ *Nucleic acid tests (NAT)*

Standard HIV blood test;

- ✓ *This test uses blood that a technician takes from your vein and sends to a lab. I can find antibodies (proteins your immune system makes when you' ve been exposed to the virus) 23-90 days after infection.*

Rabit blood test;

- ✓ *This test looks for antibodies using a drop of blood from a prick of your fingertip. It' s about as accurate as the original antibody test, but its window period could be longer -- between 18 and 90 days. Your health care provider can do this test, or you can buy a kit that lets you mail your sample in for testing.*

Antibody/antigen test

- ✓ *These tests look for both antibodies and an antigen, a substance the virus makes before your immune system can start making antibodies. An antibody/antigen test that uses blood taken from a vein can find HIV 18-45 days after you' re exposed to the virus.*
- ✓ *Newer antigen/antibody combination tests (you might hear them called " fourth generation" tests) can find HIV in 99% of people who are tested within 13-42 days of exposure. This test has become the standard HIV blood test in most labs.*

- ✓ *A rapid antibody/antigen can also be done using blood from a prick of your fingertip. A health care provider can do this test. Or you can use a mail-in kit. The window period for this test is 18 to 90 dys.*

Rabit oral test;

- ✓ *You can do this quick, easy test at home. Just rub a swab in the area between your gums and teeth to collect a sample of oral fluid (it isn't the same as saliva) for antibodies against HIV. If you've had the virus for a while, the rapid oral test is highly accurate. But if you have a new infection, even if you got it in the past few months, the test won't be as reliable. The window period is 23 to 90 days.*

Urine test;

- ✓ *These also look for HIV antibodies, but they aren't as accurate as other tests that check either your blood or oral fluid. Because it's an antibody test, its window period is similar to that of a standard HIV test.*

Hepatitis c

- ✓ *Screening for hepatitis C involves a simple, two-step blood test. The first step involves testing the blood for the presence of hepatitis C antibodies, which are proteins the body creates if exposed to the virus. If antibodies are detected, the second step involves testing the same blood sample for the presence of the virus itself. A positive result indicates current infection.*
- ✓ *Your doctor administers this test in minutes in the office by drawing a small amount of blood from a vein in the arm and sending it to a laboratory. The results are usually available the next day.*

Hepatitis B

- ✓ *Our doctors may also recommend hepatitis B screening for people with certain medical conditions that require treatment with immunosuppressive medication. These therapies can cause a dormant hepatitis B virus to reactivate, even if the infection hasn't been diagnosed or caused symptoms. People with rheumatoid arthritis, inflammatory bowel disease, or cancer, for instance, may be tested for hepatitis B before starting treatment with immunosuppressive medication.*
- ✓ *To test for hepatitis B, your doctor draws a small amount of blood from a vein in the arm and sends it to a laboratory for analysis. Results are usually available within days.*

Hepatitis c

- ✓ *Screening for hepatitis C involves a simple, two-step blood test. The first step involves testing the blood for the presence of hepatitis C antibodies, which are proteins the body creates if exposed to the virus. If antibodies are detected, the second step involves testing the same blood sample for the presence of the virus itself. A positive result indicates current infection.*
- ✓ *Your doctor administers this test in minutes in the office by drawing a small amount of blood from a vein in the arm and sending it to a laboratory. The results are usually available the next day.*
- ✓ *Food and Drug Administration has approved some at-home screening tests for hepatitis C. They are available for purchase online. To complete an at-home test, prick the tip of a finger with a small needle and place a blood sample on a piece of paper—both needle and paper are included in the test kit—and mail it to a laboratory for testing. Test results are available in two weeks.*

Malaria

- ✓ *Malaria parasites can be identified by examining under the microscope a drop of the patient's blood, spread out as a " blood smear" on a microscope slide. Prior to examination, the specimen is stained (most often with the Giemsa stain) to give the parasites a distinctive appearance.*

VDRL

- ✓ *Screening for syphilis is typically performed with blood testing to detect antibodies indicating possible infection with syphilis. If the first test is positive, a second blood test is performed to confirm the diagnosis.*
- ✓ *Rapid point-of-care testing for antibodies against syphilis, which gives results in 5 to 30 minutes, are generally less accurate and less widely used.*

32.BLOOD COMPOUNENTS AND SEPARATION

INTRODUCTION TO BLOOD COMPOUNENTS

PLASMA:

- ✓ *Plasma accounts for around 55% of blood fluid in humans. Plasma is 92% water, and the contents of the remaining 8% include: glucose, hormones, protein' s, fats, vitamins*

ERYTHROCYTES;

- ✓ Red blood cells have a slightly indented, flattened disk shape. They transport oxygen to and from the lungs. Haemoglobin is a protein that contains iron and carries oxygen to its destination. The life span of a red blood cell is 4 months, and the body replaces them regularly. The human body produces around 2 million blood cells every second.

LEUKOCYTES:

- ✓ it make up less than 1% of blood content, forming vital defences against disease and infection. The number of white blood cells in a microliter of blood usually ranges from 3,700– 10,500. Higher or lower levels of white blood cells can indicate disease.

THROMBOCYTES:

- ✓ Platelets interact with clotting proteins to prevent or stop bleeding. There should be between 150,000 and 400,000 platelets per microliter of blood.

PLASMA SEPARATION

- ✓ At first, we have taken a blood bag (double bag) and we have calculated the blood bag weight.
- ✓ Then we folded the double bag (see fig10) properly and we placed in the centrifuge machine (see fig 11)
- ✓ At the rpm 2800 for 20 mins
- ✓ After 20 mins we can observe the settlement of RBC in the bottom of the blood bag and plasma is clearly visible
- ✓ By the help of plasma expresser (see fig 13) we can transfer the plasma to another empty bag which is connected to blood bag.
- ✓ So that the plasma is separated and we should check the weight
- ✓ If the weight is lower than the normal range, we can add sagam to that bag by the help of connected tubes.
- ✓ After that we can store the plasma in refrigerator, screened means we can keep in -40' c, non-screened means -80' c (see fig



Figure(19);plasma



Figure(20); Blood bag cetrifuge separator

figure(21);plasma

33. CROSS MATCHING

Principle of Cross Matching

- ✓ Cross matching is based on the principle of serological detection of any clinically significant irregular /unexpected antibodies in either donor or recipient' s blood. There are two types of cross matches:

Major Cross Match:

- ✓ It involves testing the donor' s red cells with recipient' s serum to determine the presence of any antibody which may cause hemolysis or agglutination of donor red cells. This is more important than minor cross match.

Minor Cross Match:

- ✓ *It involves testing of donor' s plasma with recipient' s red cells to determine the presence of any antibody which may cause hemolysis or agglutination of recipient' s red cell*

Major Cross Match

- ✓ *Prepare donor and recipient' s blood sample: Donor' s red cells and recipient' s serum/plasma.*
- ✓ *Prepare 3-5% saline cell suspension of red cells.*
- ✓ *Label a test tube.*
- ✓ *Add two drops of recipient' s serum and one drop of donor cell suspension.*
- ✓ *Mix and incubate the tubes at 37 degree Celsius for about 60 minutes.*
- ✓ *Decant the serum completely and wash the cells three times in saline.*
- ✓ *Add two drops of Anti-human Globulin (AHG) and mix. Allow to stand at room temperature for 5 minutes.*
- ✓ *Centrifuge at 1500 rpm for 1 minute.*
- ✓ *Observe macroscopically and microscopically for agglutination.*
- ✓ *If macroscopic agglutination is not observed, transfer a small amount onto a glass slide and examine for microscopic agglutination. Rouleaux is not an indication of incompatibility.*

Minor Cross Match

- ✓ *Prepare donor and recipient' s blood sample: Recipient' s red cells and donor' s serum/plasma.*
- ✓ *Label a test tube.*
- ✓ *Add two drops of donor' s serum and one drop of recipient' s cell suspension.*
- ✓ *Mix and incubate the tubes at 37 degree Celsius for about 60 minutes.*
- ✓ *Decant the serum completely and wash the cells three times in saline.*
- ✓ *Add two drops of Anti-human Globulin (AHG) and mix. Allow to stand at room temperature for 5 minutes.*
- ✓ *Centrifuge at 1500 rpm for 1 minute.*
- ✓ *Observe macroscopically and microscopically for agglutination.*

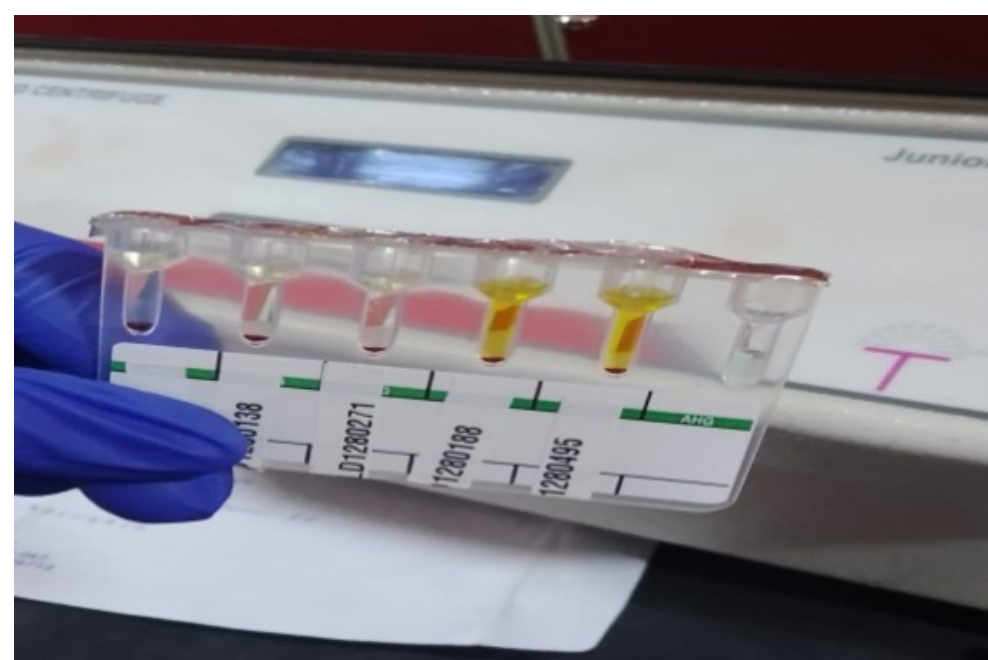
- ✓ *If macroscopic agglutination is not observed, transfer a small amount onto a glass slide and examine for microscopic agglutination. Rouleaux is not an indication of incompatibility*



Figure(22);centrifuge



Figure(23);cooms test



Figure(24);cooms card

34.BLOOD BANKING RECORDS

RECORDS MANAGEMENT;

- ✓ *All transfusion records in the recipient's medical chart shall be retained in accordance with care facility policy*
- ✓ *A complete record pertaining to the identification of the blood component including Transfusion Medicine Laboratory testing results and worksheets and the collecting facility shall be retained indefinitely*
- ✓ *The recipient transfusion data file in the Transfusion Medicine Laboratory shall be retained indefinitely*

✓ *For each blood component issued, a recont system shall be in place which documents*

✓ *Recipient's name and identification number*

✓ *Recipient's ABO group*

✓ *Recipients Rh group*

✓ *Identification number and use 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*

Vital inspection

- ✓ *Companiouny venncation for red ceits and granulocytes*

Visual inspection

- ✓ *Records of inspection of blood components and blood products prior to sue shall be retained for five years*
- ✓ *Records for all facilities shall ensure that it is possible for blood components and blood products to be traced from its source to fual disposition.*
- ✓ *The record system must provide a means to locate and access all records related to a given blood component or blood product. These records must be kept indefinitely, The Transfusion Medicine Laboratory stall develop and maintain records that demonstrate that the quality system is operating in an effective smear.*
- ✓ *Healthcare employee signatures initials and computer identification shall be retained for ten years*
- ✓ *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*
- ✓ *For cach blood product issued, a record system shall be in place which documenti*

✓ Recipient's name and identification number

✓ Blood product name and manufacturer

✓ Lot number

35.CONCLUSION

- ✓ We have went internship to lions blood bank ,Ambattur I have got a know ledge about blood bank ,blood groups and handling blood and blood compounds.
- ✓ I have observed the machines which is placed in the blood bank and I also know to handle.
- ✓ In conclusion, this internship has been a very useful experience for me and I can also safely handle a patient.

FIGURE NO	TOPIC	PAGE NO
1	Biochemical	6
2	TSI	8
3	Citrate	9
4	Macconkey agar	11
5	Blood agar	12
6	Salmonella shigella	15
7	XLD agar	17
8	Autoclave	19
9	Sland preparaton	21
10	Blood smear	25
11	Gram staining	26
12	CBC mechine	27

13	<i>Urine strip</i>	29
14	<i>SDS page</i>	35
15	<i>Blood bag</i>	32
16	<i>Blood donation area</i>	34
17	<i>Blood grouping reagent</i>	34
18	<i>Plasma centrifuge</i>	35
19	<i>plasma</i>	40
20	<i>centrifuge</i>	40
21	<i>Plasma separator</i>	40
22	<i>Cooms test</i>	42
23	<i>Cooms card</i>	42

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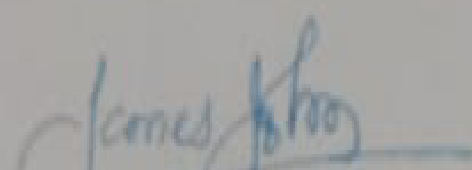


CERTIFICATE OF INTERNSHIP

This Internship program certificate is awarded to

Ms. SURUTHIKA P

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.


DR. JAMES JOHN

CO-ORDINATOR
MEDICAL LABORATORY TECHNOLOGY


MRS. V. D SAGAYAMARY

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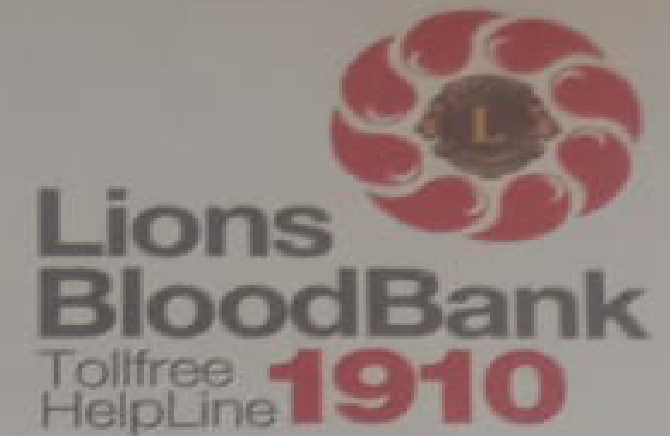


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HEAD OF THE DEPARTMENT
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DR. S KANNAN
MEDICAL SUPERINTENDENT
SATHYABAMA GENERAL HOSPITAL

Sharing Life. Saving Lives...since 1984



**Madras Egmore
Lions Blood Bank &
Research Foundation**

Date: 12th Dec 2022

TO WHOMSOEVER IT MAY CONCERN

This is to certify that Ms. Suruthika. P, 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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