

INTERNSHIP REPORT

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SATHYABAMA INSTITUTE OF SCIENCE AND TECHNOLOGY

In partial Fulfilment for 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

JEPPIAAR NAGAR, RAJIV GANDHI SALAI, CHENNAI - 600 119

APRIL 2024



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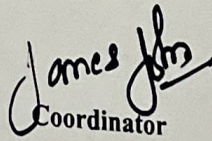
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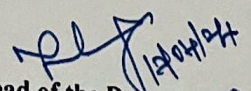
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BONAFIDE CERTIFICATE

This is to certify that this internship report is the bonafide work of **Mr. Aravinth.A (41737026)** student of III-year B.Sc., Department of Medical Laboratory Technology, School of Allied Health Sciences, Sathyabama Institute of Science and Technology has done his internship work in the "LIONS BLOOD BANK AND RESEARCH FOUNDATION at Ambattur and VOLUNTARY HEALTH SERVICES at Adyar under our supervision from August 2023 to April 2024.

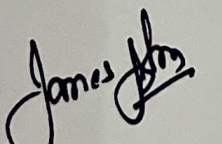

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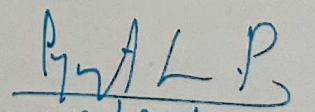
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DECLARATION

I, **A. Aravinth (41737026)**, 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**.

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We wish to express our thanks to all Teaching and Non-teaching staff members of the Department of MEDICAL LABORATORY TECHNOLOGY who were helpful in many ways for the completion of the internship.

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1.INTRODUCTION

I had the opportunity to do my internship at institutions, **VOLUNTARY HEALTH SERVICES, ADYAR** and **LIONS BLOOD BANK AND RESEARCH FOUNDATION, AMBATTUR**. During the period from 28.11.22 to 03.12.22 , I completed my internship at Lions blood bank and research foundation in Ambattur followed by an internship at Voluntary health services from 01.11.23 to 30.11.23. These internships provided me with valuable experience observing a wide range of tests conducted in both blood banks and diagnostic laboratories. This report summarizes my learning and observations from these internships.

2.PHLEBOTOMY

Phlebotomy is the act of drawing or removing blood from the patients through a cut or puncture in order to obtain a sample for analysis and diagnosis. I have gained knowledge about several typical responsibilities carried out in phlebotomy, such as selecting the correct tube color for blood sample collection and effectively communicating with patients during the process.

Materials required:

- Gloves
- Syringes
- Evacuated collection tubes
- Alcohol wipes
- Tourniquet

Procedure:

- Confirming the patient's identity and medical records
- Utilizing sterile equipment, primarily vacuum tubes, for blood collection.
- Choosing the suitable vein for blood extraction.
- Prior to blood collection, it is advised to label the designated tube with patient information for accurate identification.
- The blood samples are transported to the laboratory for analysis.
- Appropriately disposing of used needles and biohazardous materials.

This department made me understand the duty of a phlebotomist is to guarantee the secure and effective retrieval of blood samples, all also ensuring a favorable response from the patient.

3. CLINICAL PATHOLOGY

I have gained knowledge about procedures for urine routine and physical examination of stool samples, including urine strips, urine deposit, wet mount for stool, physical examination of stool, and occult blood.

3.1 OCCULT BLOOD:

The faecal occult blood test (FOBT) is a simple, inexpensive and most frequently performed chemical screening test on faeces. It is done for the detection of blood in the stool that is not visible.

Principle:

The principle of chemical tests to detect occult blood is based on the fact that haemoglobin and its derivatives react in a similar way to peroxidase enzymes by catalysing the transfer of an oxygen atom from the peroxide to a chromogen such as benzidine, o-toluidine, guaiac or aminophenazone.

Procedure:

- Collect a stool sample- The first step in testing for occult blood is to collect a small sample of stool. This can be done at home using a special collection kit provided by your healthcare provider.
- The test is performed on a paper slide that contains paper squares coated with **guaiac**, a chemical derived from tree resin. A small portion of stool(faecal) specimen is applied to the paper.
- A developer solution containing hydrogen peroxide is added to the paper.
- If the blood is present in the specimen, the iron (Fe) in the haemoglobin catalyses the reaction between guaiac in the paper and the hydrogen peroxide. The completed reaction forms a blue color.

3.2 URINE ROUTINE:

Urine routine tests are among the most commonly scheduled tests. The routine consists of tests designed to assess the physical, chemical, and microscopical properties of urine. It aids in evaluating general health and serves as an early warning sign of illnesses such as kidney disease, urinary tract infection and liver disease

Urine routine includes:

- Urine strip
- Urine deposit.

Procedure for Sample collection:

- Instruct the patient to collect a clean, mid-stream urine sample in a sterile container.
- Ensure the date and time of collection are recorded on the container.
- Seal the container tightly to prevent leakage.
- Send the sample to a laboratory for analysis within 2 hours.
- The laboratory will visually examine the urine, measure its volume, and test for pH, protein, glucose, ketones, blood, and nitrites.
- The results will be interpreted to diagnose any underlying illnesses or monitor treatment progress.

Urine strip



Procedure:

- Collect a fresh urine sample in a clean container.
- Immerse the urine strip into the urine sample, ensuring all reagent pads are covered.
- Remove the strip after the specified time (typically 1 minute).

- Shake off excess urine from the strip using Kim wipes.
- Compare the reagent pad colors to the provided color chart or use a urine strip analyzer to detect substances like glucose, protein, blood, ketones, and pH levels.
- Record the result using the analyzer.
- Dispose of the urine strip and sample according to waste disposal guidelines.

Urine deposit:

Urine deposit refers to the identification of mucus, RBC or any other bacterial substance.

Procedure:

- Transfer the urine from the container into a centrifuge tube
- Centrifuge the urine at 1500 rpm for 10 minutes.
- Remove the supernatant and collect the deposit using a dropper.
- Place a coverslip over the deposit and examine it under a microscope.

3.3 STOOL EXAMINATION:

Stool examination helps to diagnose certain conditions that affect the digestive tract. These conditions may include infection, poor nutrient absorption or cancer. It involves collecting a sample of stool and observing its consistency, color, odor and any abnormal substances.

Procedure:

- **Stool Collection:** Patients are instructed to collect a small, uncontaminated sample in a clean container, ensuring no urine or water mixes with it.
- **Color Inspection:** The color of the stool, typically brown, provides insight into digestive health. Abnormal colours like red (indicating blood), black (from upper gastrointestinal bleeding), or pale (suggesting liver or bile duct issues) should be noted.
- **Consistency Assessment:** Stool consistency, such as watery (diarrhea) or hard (constipation), offers diagnostic clues.
- **Odor Examination:** The smell of stool can indicate gastrointestinal disorders like malabsorption or bacterial overgrowth.
- **Detection of Abnormal Substances:** The stool sample is examined for mucus, pus, parasites, undigested food, and other abnormal substances.

- **Occult Blood Testing:** A guaiac test may be used to detect occult (hidden) blood in a small stool sample, indicating potential gastrointestinal bleeding.

4. MICROBIOLOGY

INTRODUCTION:

I have extensively studied the procedures utilized in Microbiology labs, where different microorganisms are researched.

4.1 COMMON MEDIA PREPARED IN THE MICROBIOLOGY LAB:

1. Blood agar:

It is a general-purpose medium used for the isolation of a wide variety of microorganisms, especially fastidious organisms. Blood agar contains sheep blood which provides nutrients and allows for the detection of haemolytic activity.

Preparation:

To prepare blood agar, mix 5-10% defibrinated blood with cooled melted agar, then pour 25 ml of the mixture into each plate.

2. MacConkey agar:

It is a selective and differential medium used for the isolation and identification of gram-negative bacteria. MacConkey agar contains bile salts and crystal violet, which inhibit the growth of gram-positive bacteria.

Preparation:

12.88 grams of agar powder were mixed with 250 ml of distilled water. After autoclaving at 121°C for 15 minutes and cooling, the media was poured into plates, with each dish accommodating 25 ml.

3. Chocolate agar:

It is used for the isolation of microorganisms from *Haemophilus* and *Neisseria* species. Chocolate agar is made by heating blood agar to release hemin and NAD.

Preparation:

7 grams of nutrient agar powder were mixed with 250 ml of distilled water. After autoclaving at 121°C for 15 minutes and cooling to 45°C, 5% defibrinated blood was added slowly and evenly.

4. Nutrient agar:

Nutrient agar is used for the cultivation of a wide range of microorganisms. Nutrient agar contains peptones, beef extract, starch, casein hydrolysate and is used for the diffusion of antimicrobial agents.

5. Muller Hinton agar:

This agar medium is used for the antibiotic susceptibility testing of bacteria.

Preparation:

9.5 grams of agar powder were mixed with 250 ml of distilled water. After autoclaving at 121°C for 15 minutes and cooling, the media was poured into plates, with each plate receiving 25 ml of the mixture.

Preparation and sterilization of culture media:

- Microbes require nutrients to grow. These are supplied by either solid or liquid culture media. The standard solid medium is nutrient agar, a gelatinous substance derived from seaweed. The basic liquid medium is nutrient broth, typically a mix of water, meat extract peptone, and sodium chloride.
- The agar has a consistent composition, with the exception that it contains 15 grams per liter of agar. The media achieves a final pH of 7.4.

4.2 AUTOCLAVING:

An autoclave is a pressure chamber used to sterilize equipment and supplies by subjecting them to high-pressure saturated steam at 121 °C (249°F) for around 15–20 minutes depending on the size of the load and the contents. It was invented by Charles Chamberland in 1879.

Objective:

To prepare sterile nutrient agar for culturing microorganisms.

Materials required:

- Commercial Nutrient Agar
- Peptone powder
- Beef extract powder
- Sodium chloride
- Yeast extract
- Electronic Weighing Balance
- Measuring cylinder
- Scott bottles

- Distilled water
- Beakers
- Glass rod

Procedure:

- Agar powder is weighted approximately in the beaker then it is dissolved with distilled water. The broth is mixed well.
- The bottles are loosely recapped and set aside for sterilization.
- All media is sterilized at 121°C for 15 minutes.
- After autoclaving, the media is removed. The broth preparation is allowed to cool then the cap of each bottle is tight.

STAINING

The correct identification of microorganisms is of fundamental importance to microbial systematists as well as to scientists involved in many other areas of applied research and industry (e.g. agriculture, clinical microbiology and food production). Most bacteria are quite colourless and transparent and have a refractive index similar to that of the aqueous fluids in which they are suspended.

4.3 GRAM STAINING:

It was developed by Christian Gram in 1884, by using this procedure, bacteria are subdivided by their reaction to this stain into those which retain it, termed Gram-positive, and those which are decolourized, termed Gram-negative. Gram staining requires 4 different solutions:

- Basic dye
- Mordant
- Decolourising agent
- Counter stain

Reagents used in stain preparation:

- Crystal violet
- Grams Iodine
- Safranin

Principle:

The differential response towards Gram reaction is attributed to the difference in the cell wall of these bacteria. Gram negative bacteria have cell wall generally thinner than those of gram-positive bacteria. Gram negative ones have higher lipid content than the gram-positive bacteria. During staining of gram-positive bacteria, the alcohol treatment extracts the lipid, which results in increased porosity or permeability of the cell wall. The CV-I (crystal violet iodine) complex can be extracted and the gram-negative organism is decolorized. These cells subsequently take the colour of the safranin a Counter stain. The cell walls of gram-positive bacteria, due to their different composition (lower lipid content) become dehydrated during treatment with alcohol presumably causes diminution in the pore diameter of the walls of peptidoglycan and CV-I complex is trapped in the wall following ethanol treatment. The pore size decreases, permeability is reduced, and CV-I complex cannot be extracted. Hence these cells remain purple violet. While in gram negative bacteria the amount of peptidoglycan is very low hence the cross linking is reduced thus making space for crystal violet iodine complex to escape.

Procedure:

- Prepare smear on a clean slide.
- Stain with crystal violet for 30 seconds.
- Rinse with water.
- Flood the film with Gram's iodine and allow it to act for 30 sec.
- Rinse with water.
- Decolorise with 95% alcohol. Rinse with water.
- Counter stain with safranin for 20-30 sec.
- Rinse with water and blot dry.
- Examine under oil immersion objective.

Interpretation:

Gram positive	Gram negative
Purple colour	Pink colour

4.4 ZIEL-NEHLSON STAINING:

The Ziel-Nehlsen method employs carbol fuchsin, acid alcohol and a blue or green counter stain. Acid fastness is a phenomenon that is found in certain types of bacteria where they resist the process of de-colorization that occurs when acid is used to wash a sample that contains these bacteria.

Principle:

This method is employed for staining *Mycobacterium tuberculosis* and *Mycobacterium leprae*, also known as acid-fast bacilli. These bacteria are stained using carbol fuchsin, a red dye.

Objectives:

To confirm the presence of the bacteria known as mycobacteria tuberculosis which is the bacteria responsible for causing tuberculosis. In laboratories where large number of sputum, gastric washings, urine, and other body fluid samples are tested for pathogenic mycobacteria, fluorochrome acid fast staining is used in conjunction with the Ziel-Nehlsen method.

Reagents:

- Carbol fuchsin
- Crystalline phenol
- 95% alcohol
- Distilled water
- 95% ethyl alcohol
- 0.5% methylene blue or malachite green

Procedure:

- Pour carbol fuchsin on the slide and heat carefully until steam rises.
- Stain for 3-5 min but do not allow to dry.
- Wash well with water.
- Decolorize using acid alcohol for 10-20 s. c
- Changing twice and counter stain for 2 min with methylene blue or malachite green.

Interpretation:

Acid-fast bacteria	Non-acid fast bacteria
Retain primary dye	Methylene blue
Carbol fuchsin- Stain pink	Appears blue

4.5 URINE CULTURE:

A urine culture is a diagnostic test used to identify the presence of bacteria or other microorganism in a urine sample. This test is commonly used to diagnose urinary tract infections and determine the appropriate treatment.

Procedure:

- Collect a midstream clean-catch urine sample, ensuring proper genital area cleaning to prevent contamination.
- Inoculate the urine specimen onto culture media like blood agar and MacConkey agar, providing optimal growth conditions for different bacteria.
- Incubate the inoculated media at 37°C for 24 to 48 hours to allow microorganism growth.
- Examine and identify colonies grown on the media based on appearance, texture, and other characteristics, using biochemical tests like oxidase and catalase tests, and API strips.
- Test identified microorganisms for antibiotic susceptibility to determine appropriate antibiotic treatment for the infection.

Interpretation:

Growth type	Interpretation
No growth	Indicates no significant bacterial growth, urine sample is considered negative for infection.
Significant growth	Suggests presence of urinary tract infection, colonies are identified, and antibiotic susceptibility testing is done for appropriate therapy.
Mixed growth	Presence of multiple microorganism types, each type identified and tested for antibiotic susceptibility individually.

4.6 STOOL CULTURE:

The stool culture is a test that detects and identifies bacteria that cause infections of the lower digestive tract. The test distinguishes between the types of bacteria that cause disease (pathogenic) and the types that are normally found in the digestive tract (normal flora).

Procedure:

- Use a clean, dry container to collect a fresh stool sample, preferably from different parts of the stool.
- Streak the stool sample onto agar media plates like MacConkey agar, Salmonella-Shigella agar, or Campylobacter agar, using a sterile swab or loop.
- Incubate the inoculated agar plates at specific temperatures, typically between 35-37°C, and under specific atmospheric conditions, based on the suspected pathogen.

Interpretation:

Growth type	Interpretation
No growth	Absence of significant bacterial, viral, or parasitic infection.
Normal flora growth	Expected growth of normal bacterial flora (e.g., E. coli, lactobacillus); not indicative of infection
Pathogenic growth	Presence of pathogenic microorganisms (e.g., Salmonella, Campylobacter, Shigella, Clostridium difficile); indicates infection requiring treatment.
Mixed growth	Mixture of normal flora and pathogens, indicating a mixed infection; further identification and testing needed to determine significance of each organism.

4.7 BLOOD CULTURE:

A blood culture is a laboratory test in which blood, taken from the patient, is inoculated into bottles containing culture media to determine whether infection-causing microorganisms (bacteria or fungi) are present in the patient's bloodstream.

Principle:

The principle underlying blood culture involves introducing a blood sample into a suitable culture medium, which provides the necessary nutrients for bacterial and fungal growth, identify the microbial etiology of the bloodstream infection, help determine the source of infection, provide an organism for antimicrobial susceptibility testing and optimization of antimicrobial therapy.

Procedure:

- Collect two sets of blood samples from different sites under sterile conditions to minimize contamination risk, often from veins in the arm.
- Inoculate collected blood samples into culture bottles with specific growth media that support bacterial or fungal growth and inhibit contaminants.
- Incubate inoculated culture bottles in a controlled environment for optimal growth conditions, varying incubation time based on suspected pathogens.
- Regularly examine culture bottles during incubation for signs of microbial growth, including visual inspection or automated detection systems.
- Identify microorganisms using techniques like Gram staining, biochemical tests, or molecular methods to determine the cause of the bloodstream infection.

Interpretation:

The interpretation of blood culture results depends on whether there is growth of microorganisms or not. The following interpretations can be made:

Blood culture result	Interpretation
Positive	Presence of microorganism indicated bloodstream infection. Identified pathogens guide appropriate antibiotic treatment. Susceptibility testing determines effective antibiotics.
Negative	Absence of detectable microorganisms. Does not completely rule out infection. Further clinical evaluation may be necessary.
Contaminated	Blood culture sample is contaminated with non-infectious bacteria. Occurs due to improper collection or handling.

Volume of Sample to be collected:

- Adult: 10ml of blood and 40ml of BHIB
- Paediatric: 2ml of blood and 18ml of BHIB
- Neonate: 1ml of blood and 9ml of BHIB

where, BHB is Brain Heart Infusion Broth and is mixed with distilled water and autoclaved.

4.8 WOUND AND PUS CULTURE

A skin or wound culture is a test to find germs (such as bacteria, a virus, fungus) that can cause an infection. A sample of skin, tissue, or fluid is added to a substance that promotes the growth of germs. If no germs grow, the culture is negative. If germs that can cause an infection grow, the culture is positive.

Principle:

The principle behind wound and pus culture is to isolate and identify the microorganisms causing an infection in a wound or pus sample. This process helps determine the type of infection and guides the selection of the appropriate treatment.

Procedure:

- Use a sterile swab or needle to collect the wound or pus sample, ensuring no contamination from the surrounding area.
- Streak the collected sample onto suitable culture media like blood agar and MacConkey agar, each supporting the growth of different microorganisms for diverse infection detection.
- Place the inoculated media in an incubator at around 37 degrees Celsius, the optimal temperature for bacterial growth, with incubation time adjusted for suspected pathogens and infection type.
- After incubation, examine the culture plates for colony growth, noting different colony characteristics (size, shape, color) indicating various microorganisms. Isolate these colonies onto separate plates for further analysis.
- Conduct identification tests on isolated microorganisms, such as gram staining, biochemical tests, and molecular techniques like PCR, to determine species, and sometimes strain or serotype, aiding in targeted treatment.

Interpretation:

Aspect	Identification
Identification	Helps identify the type of infection, e.g., <i>S. aureus</i> for skin infection, <i>S. pyogenes</i> for streptococcal infection.

Quantity	Indicates infection severity; high load of bacteria like <i>P. aeruginosa</i> or <i>E. faecalis</i> suggests a significant infection
Antibiotic susceptibility	Guides antibiotic therapy, determines effective antibiotics and resistance patterns.

4.9 VITEK 2

The VITEK 2 compact system is an automated microbiology (mainly yeasts) identification and antimicrobial susceptibility system.

Procedure:

- Identify and test bacterial or fungal samples, collect the sample from a patient or a culture plate.
- Inoculate the sample into a Vitek 2 ID card or relevant specific cards, ensuring a match with the test organism and checking the expiry date.
- Load the card into the Vitek 2 machine, input necessary patient information and identification codes, and start the automated testing process.
- The machine will conduct identification and susceptibility testing procedures, including incubation and measurement analysis.
- Upon completion, the Vitek 2 machine will produce a report detailing the microorganism's identification and susceptibility or resistance profile.
- Finally, review and interpret the results in comparison with established standards, and report the findings to aid in patient treatment, following the manufacturer's instructions for the Vitek 2 machine and ID card used.



4.10 ANTIBIOTIC SENSITIVITY TEST

An antibiotic sensitivity test is a procedure done to identify the susceptibility of a microbe to a suitable antibiotic. This is determined by the extent of inhibition of growth of a specific microbe when treated with a set of antibiotics.

Procedure:

- Isolate the bacterial strain for testing, a clinical sample such as urine, blood, or wound swab is obtained from the patient.
- The sample is then spread evenly on a sterile agar plate, such as Mueller-Hinton agar, using a sterile swab, and allowed to dry.
- Next, sterile paper disks containing specific antibiotics are placed onto the agar plate, and the plate is incubated at the optimal temperature for bacterial growth for a specific period, usually overnight.
- After incubation, the plate is examined, and the zone of inhibition around each disk, which indicates the antibiotic's effectiveness, is measured.

Interpretation:

The size of the zone of inhibition is compared to established standards, such as those set by the Clinical and Laboratory Standards Institute (CLSI), to interpret the antibiotic sensitivity results. The measured zones are classified as susceptible, intermediate, or resistant.

Antibiotic sensitivity	Zone of Inhibition	Interpretation
Susceptible	Larger	Bacteria are likely susceptible. antibiotic is likely effective in treatment.
Intermediate	Intermediate	Bacteria may be inhibited under certain conditions or at higher doses, clinical relevance varies.
Resistant	Smaller or none	Bacteria are resistant; alternative antibiotics should be considered for treatment.

5. HEMATOLOGY

INTRODUCTION:

In this laboratory department, I gained knowledge about a comprehensive range of blood tests including CBC, DC, ESR, and HbA1c, along with coagulation tests. Additionally, I observed staining procedures such as PAP stain and Leishman stain.

5.1 BLEEDING TIME:

Bleeding time is a test used to measure the time it takes for a cut to stop bleeding. The bleeding time test is dependent on appropriate functioning of platelets blood vessels and platelets and evaluates earliest hemostasis.

Procedure:

- Blood pressure of the patient is measured with sphygmomanometer the help of blood pressure of the patient should be normal before going to the further process.
- The volar surface of the forearm is cleansed with ethanol 70% and allowed to dry.
- With the help of a lancet, in quick succession, three punctures are made about 5 cm apart. Note that scars and superficial veins should be avoided.
- Start the stopwatch as soon as puncture made on the volar surface of the forearm.
- With the help of the filter paper, blood oozing from the puncture wound is gently absorbed with intervals of 15 seconds.
- The timer is stopped when blood no more mark the filter paper.
- Time measured for bleeding to stop from all the three-puncture wound is recorded.
- The average time is calculated and reported as the bleeding time.

Reference Ranges:

Normal range: 2 -7 minutes.

5.2 CLOTTING TIME:

The clotting time test, also known as prothrombin time (PT) test measures the duration it takes for the blood plasma to form a clot.

The method followed is **Capillary tube method**.

Procedure:

- Typically, a small blood sample is obtained from the patient, commonly through a finger prick or venipuncture.
- The blood is then drawn into a capillary tube, which is a slender glass tube designed to collect a precise volume of blood.
- Allow for a 5-minute interval for the blood to form a fibrin clot.
- Following the 5-minute period, break a small segment of the tube and observe the formation of a thread-like fibrin clot.
- The duration it takes for the blood to cease flowing within the capillary tube is recorded as the clotting time.

Reference ranges:

Normal range: 8-15 Minutes

5.3 HbA1C:

Machine: BIO RAD

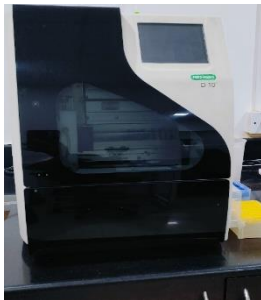
Sample preparation:

Blood is collected in EDTA tube and mix it thoroughly.

Procedure:

- Turn on the analyzer and wait for it to initialize.
- Prepare the HbA1C test samples by collecting blood in an EDTA tube. Mix the sample by gently rotating the tube to ensure the blood mixes with the anticoagulant.
- Load the test samples into the analyzer, ensuring each sample is correctly labelled to avoid mix-ups.
- Start the analysis process on the analyzer, which may involve selecting the appropriate test protocol and running the analyzer with the specified settings.
- Monitor the progress of the analysis on the analyzer's display screen.
- Once the analysis is complete, review the results provided by the analyzer. Check for any errors or inconsistencies and troubleshoot as needed.

- Record the results of the HbA1C analysis in the patient's medical records or laboratory documentation.



- HbA1C Analyzer

5.4 COMPLETE BLOOD COUNT AND DIFFERENTIAL COUNT:

Machine: SYSMAX (3part)

Principle:

Blood is sampled, diluted, and then passed through a narrow tube where cells pass by individually. The characteristics of the cells are measured using lasers or electrical impedance.

Sample preparation:

The blood is collected in EDTA tube and mix it thoroughly.

Parameters of Complete blood count:

RBC, Hb, HcT, WBC, MCV, MCH, MCHC

Parameters of Differential Count:

Neutrophil, Lymphocytes, Monocytes, Eosinophil, Basophil and Immunoglobulins.

Procedure:

- Gently mix the sample before placing it into the reaction vial.
- Up to 20 samples can be run simultaneously, with two sections available for running.
- Each section can accommodate 10 samples.
- Provide a comment indicating the start of the run after arranging the samples.
- All the parameters are entered in both count and percentage.



CBC AND DC Analyzer

5.5 ERYTHROCYTE SEDIMENTATION RATE (ESR)

The erythrocyte sedimentation rate (ESR) is a common hematological test for nonspecific detection of inflammation that may be caused by infection, some cancers and certain autoimmune diseases. It can be defined as the rate at which Red Blood Cells (RBCs) sediment in a period of one hour.

Machine: Transasia

Sample preparation:

Blood is collected in a flat tube for the convenience of ESR machine.

Procedure:

- Turn on the ESR machine using the designated button and input patient information and test parameters.
- Place the blood sample tube in the machine's slot or holder, then select the test method and start the run.
- The machine will use a needle to puncture the cap of the blood sample tube and mix the blood with the anticoagulant reagent.
- The machine will puncture the tube's cap, mix the blood with the reagent, and measure the ESR.
- Once the test is finished, view the results on the screen and remove the tube for proper disposal.



Erythrocyte Sedimentation Rate (ESR) machine

5.6 PROTHROMBIN:

A prothrombin time (PT) test uses blood samples to measure how quickly your blood forms a clot.

Procedure:

- Prepare the reagents and equipment, including the PT reagent, and turn on the Start Max coagulation analyzer, allowing it to warm up and calibrating it per the manufacturer's instructions.
- Use a cuvette designed for the machine, adding 50 μL of sample and incubating for 50 seconds before adding 100 μL of PT reagent at the 60th second.
- Record the PT value displayed on the analyzer once the test is complete and interpret it based on established reference ranges and clinical guidelines, such as the Normalized Ratio (NR).
- Clean and maintain the analyzer as per the manufacturer's instructions, disposing of used reagents and biohazardous waste properly.
- Document the test results in the patient's medical record.

5.7 ACTIVATED PARTIAL THROMBOPLASTIN

Machine: SStart Max

Sample preparation:

The venipuncture needs to be a 'clean' without excessive venous stasis. Once the needle is removed from the syringe, transfer the blood into tubes. Mix with one part of Trisodium citrate exactly nine parts of the freshly collected blood. Immediately centrifuge at 3000 rpm for 15 minutes, then move the plasma into a sterile test tube. Plasma has to be checked within three hours of collecting the blood. Platelet deficient plasma should be used for determination of heparin, hence higher centrifugation time is required.

Procedure:

- Prepare the reagents and equipment, including APTT reagent, calcium chloride, and patient plasma sample. Turn on the Start Max coagulation analyzer, allowing it to warm up. Calibrate the analyzer following the manufacturer's instructions.
- Use a cuvette designed for the machine, adding 50 μL of sample and APTT reagent. Incubate for 170 seconds, then at the 180th second, add 50 μL of calcium chloride reagent and start the timer.
- Record the APTT value displayed on the analyzer and interpret it based on established reference ranges and clinical guidelines, such as Normalized Ratio (NR).
- Clean and maintain the analyzer as per the manufacturer's instructions and dispose of used reagents and biohazardous waste properly.



APTT Analyzer

5.8 LEISHMAN'S STAIN:

Leishman stain is a mixture of methylene blue, eosin dye prepared in alcohol medium diluted with buffer or distilled water during staining procedure. Leishman stain is a differential stain that is used to variably stain the various components of the cells and it can be used to the

adherence of pathogenic bacteria to the human cells.

Principle:

Leishman Stain is a neutral stain for blood smears which was devised by the British surgeon W.B. Leishman (1865–1926). It consists of a mixture of eosin (an acidic stain), Methylene blue in methyl alcohol and is usually diluted and buffered during the staining procedure. It stains the different components of blood in a range of shades between red and blue.

Materials required:

- Leishman Stain
- Microscopic Glass Slide
- Phosphate buffer (pH 6.8)
- Graduated pipettes
- Measuring cylinder
- Distilled Water
- Pasteur pipette

Procedure:

- Cover the well dried, thin blood smear with undiluted Leishman Stain solution by counting the drops of Leishman stain.
- Let it stand for 2 minutes, the methanol present in the stain fixes the smear onto the glass slide.
- After 2 minutes, add twice the amount of distilled water or Phosphate buffer solution and mix the content by swirling or by blowing gently. Incubate the slides for at least 10 min at 37 °C. This will stain the blood cells.
- Rinse the slides thoroughly with Phosphate buffer solution up to 2 minutes or until it acquires a purple-pinkish tinge.
- Air dry the slides in a tilted position so that the water easily remove out of the slides.
- Let it dry in air for few hours and then observe the slides under oil immersion objective lens of the microscope.

5.9 PAP STAINING:

The Papanicolaou stain (PAP) is designed to differentiate between a variety of cells in vaginal smears for the detection of vaginal, uterine and cervical cancer. Additionally, this procedure is valuable for staining a variety of other body secretions and cell smears. The procedure was developed in the early 1942s by George Papanicolaou.

Materials required:

- Specimen slides
- Alcohol
- Xylene 1&2
- Hematoxylin
- EA 50 solution
- OG 6 Solution
- Alcohol 1, 2&3 (70%, 95%, 100%)
- Acetic acid
- Eosin
- Distilled water
- Cover slips
- Staining dish

Procedure:

- Prepare slides by fixing the specimen with 95% ethanol for 1-2 minutes, then stain them with Haematoxylin for 2-3 minutes to turn cell nuclei blue.
- Rinse the slides with water to remove excess Haematoxylin, then stain them with Eosin for 30 seconds to color the cytoplasm pink.
- Rinse the slides again to remove excess Eosin before dehydrating them in graded ethanol solutions (70%, 95%, 100%) for 30 seconds each.
- Clear the slides by immersing them in xylene for 1-2 minutes to eliminate any remaining ethanol.
- Mount the slides with a mounting medium and cover them with a coverslip, then allow them to dry completely.

CONCLUSION:

I have acquired knowledge about the instruments used in a hematology lab and how to operate them.

6. BIOCHEMISTRY

INTRODUCTION:

During this laboratory session, through a series of experiments and analyses, I have learnt the intricate biochemical pathways governing cellular function and metabolism. Specifically, I explored the functionalities of the Siemens Biochemical Analyzer and Roche Electrolyte analyser.

6.1 SIMENS BIOCHEMICAL ANALYSER:

The Siemens Biochemical Analyzer is utilized extensively in laboratory settings to analyse various biochemical parameters within biological samples. Its primary function is to measure concentrations of key biomolecules such as glucose, cholesterol, proteins, enzymes, electrolytes, and other metabolites present in blood, urine, or other bodily fluids.

Procedure:

- Activate the Siemens biochemistry analyzer by pressing the power button.
- Allow the instrument to undergo warm-up procedures and execute any necessary startup routines.
- Follow the manufacturer's guidelines to load samples onto the sample tray.
- Input the requisite information and parameters into the analyzer, including sample type, test specifications, and other pertinent data.
- Initiate the analysis by selecting the desired test from the analyzer's interface.
- for the analyzer to complete the analysis, during which it will measure and assess the samples.
- Upon completion of the analysis, review the results displayed on the screen or obtain a printed copy.
- Dispose of any used samples in accordance with biohazard protocols.
- Clean and maintain the analyzer as per the manufacturer's instructions to uphold accuracy and reliability for future analyses.

- Power down the analyzer once usage is complete.



Simens Electrolyte Analyser

6.2 ROCHE ELECTROLYTE ANALYSER:

The Roche electrolyte analyser is intended to use for in vitro testing of samples of whole blood, serum or plasma, and urine for the quantitative measurement of electrolytes.

Procedure:

- Turn on the analyzer by pressing the power button.
- Follow the instructions on the screen to make sure the analyzer is working accurately.
- Check that the chemicals needed for testing are in the analyzer.
- Get the samples ready for testing based on what the analyzer needs.
- Load the samples into the analyzer using the provided tool.
- Select the appropriate test you want the analyzer to do.
- Wait for the analyzer to finish, and it will show the results on the screen.
- Record the results to use them for taking care of patients or other purposes.



Roche Electrolyte Analyser

6.3 LIVER FUNCTION TEST:

Liver function tests checks the levels of certain enzymes and other proteins in your blood.

Tests under LFT:

- Total Bilirubin
- Direct Bilirubin
- SGOT (Serum Glutamic Oxaloacetic Transaminase)
- SGPT (Serum Glutamic Pyruvic Transaminase)
- ALP (Alkaline Phosphatase)
- Total protein
- Albumin

6.4 RENAL FUNCTION TEST:

Renal function tests (RFT) are a group of tests that may be performed together to evaluate kidney function. The tests measure levels of various substances, including several minerals, proteins, and glucose in the blood to determine the current health of the kidneys.

Tests under RFT:

- BUN (Blood urea nitrogen)
- Creatinine - blood.
- Creatinine clearance.
- Creatinine - urine.
- Urea
- Uric acid
- Bicarbonate

CONCLUSION:

In conclusion, I have acquired knowledge in these techniques and attained comprehensive knowledge regarding the tests conducted in clinical laboratories. Through this learning process, I have developed a deeper understanding of laboratory procedures and its importance in health care.

7. SEROLOGY LAB

Serology is the scientific study of blood serum and other bodily fluids. In practical immunological terms, serology is the diagnostic identification of antibodies in the serum. Serological tests are performed on blood serum, and body fluids such as semen and saliva. During this laboratory session, I have examined different serological tests and methodologies to assist in the identification of infectious diseases, autoimmune disorders, and various other health conditions.

Samples:

- Blood
- Urine
- Saliva
- Semen
- Throat swab

Examinations to be performed in this laboratory:

- HIV Screening Test
- HBsAg Screening Test
- CRP (C- Reactive protein)
- Widal test
- RA Factor
- VDRL
- HCV Screening Test

7.1 HIV SCREENING TEST

An HIV test examines a blood sample to determine whether people have HIV (Human Immunodeficiency Virus). HIV is a virus that affects and destroys immune system cells, which protect the body against pathogens such as bacteria, viruses, and fungi.

Procedure:

- Collect all the components required for the HIV screening test using the card method, provided in the kit.
- Add 3 drops of the buffer provided in the kit to the card.

- Once dried, add 1 drop of the serum sample to the card.
- Add 5 drops of buffer to the card and allow it to dry.
- After drying, add 2 drops of Enzyme conjugate to the card, followed by 5 drops of buffer.

Interpretation:

- Presence of three dots on the card indicates the presence of both Type 1 and Type 2 HIV antibodies.
- If there are two dots present in the T1 and control areas, it indicates the presence of Type 1 HIV.
- The C always represents the control.



7.2 HBsAg:

Hepatitis B surface antigen (HBsAg) is a protein that appears in the blood when you have a hepatitis B infection. A HBsAg blood test can detect this antigen.

Principle:

The HBsAg screening test using the card method relies on immunoassay techniques, particularly lateral flow chromatographic immunoassay. Specific antibodies are employed in the test, which can bind to the hepatitis B surface antigen (HBsAg) found in the patient's blood sample.

Procedure:

- Collect a small blood sample, typically from a finger prick, using a lancet.
- Place the blood sample onto the test card's sample pad.
- Add a few drops of buffer solution onto the sample pad to facilitate the flow of the blood sample through the card.

- The serum sample moves along the test card via capillary action, encountering a specific antibody that binds to HBsAg, if present.
- Interpret the results by observing the appearance of a visible line indicating a positive HBsAg result, along with the appearance of the control line to verify the test's accuracy, following the manufacturer's instructions.

Interpretation:

Interpretation	Result
Visible line at test and control regions	Positive for HBsAg, indicates presence of hepatitis B virus in sample.
Only control line appears, no test line	Negative for HBsAg; indicates absence of hepatitis B virus in sample

7.3 CRYPTOCOCCI BY STRIP METHOD:

Principle:

The strip method for identification of Cryptococci is based on the presence of specific antigens that react with antibodies on the test strip. The test strip contains multiple capture lines, each coated with a different monoclonal antibody specific to different *Cryptococcus* species.

Procedure:

- Obtain a sample from the suspected source of Cryptococci, such as blood.
- Use a test tube and add 1 drop of the diluent provided in the kit.
- Add 40µL of the sample to the test tube.
- Insert the strip into the test tube.
- Allow the strip to incubate for the recommended time, typically around 10 minutes.
- Interpret the results based on the presence or absence of coloured bands on the test strip.

Interpretation:

Interpretation	Result
Presence of coloured band	Indicates presence of Cryptococci species corresponding to that line.

Absence of coloured band	Indicates absence of Cryptococci species in the sample.
Faint lines or incomplete bands	May indicate a weak positive result, further test are needed for verification

7.4 C-REACTIVE PROTEIN (CRP)

C - reactive protein (CRP) test is a quantitative measurement of the level of CRP in the blood. CRP is an acute phase reactant that increases in response to inflammation and infection in the body. The test helps in the diagnosis and monitoring of various inflammatory conditions, such as bacterial infections, autoimmune diseases, and cardiovascular diseases.

Procedure:

- A needle and syringe are used to collect the patient's blood sample from a vein in the arm.
- The blood sample is centrifuged to separate the serum from the cells.
- An automated analyzer is used to test the serum, measuring the concentration of CRP.
- The results are reported as the amount of CRP in the blood, typically in milligrams per liter (mg/L).

Interpretation:

- CRP levels below 10 mg/L are considered normal.
- Elevated CRP levels might suggest acute inflammation or infection.
- CRP levels can help evaluate the efficacy of treatment for inflammatory conditions.
- Increased CRP levels may also indicate a higher risk of cardiovascular diseases.



CRP Analyzer

7.5 WIDAL TEST:

Widal test is an agglutination test which detects the presence of serum agglutinins(H and O) in patients' serum with typhoid and paratyphoid fever. It was developed by Georges Ferdinand Widal in 1896.

Principle:

Widal test is an agglutination test in which specific typhoid fever antibodies are detected by mixing the patient's serum with killed bacterial suspension of Salmonella carrying specific O, H, AH and BH antigens and observed for clumping.

The main principle of Widal test is that if homologous antibody is present in patients' serum, it will react with respective antigen in the suspension and gives visible clumping on the test slide.

Procedure:

- Collect a blood sample from the patient and let it clot.
- Use centrifugation to separate the serum from the sample.
- Prepare multiple test tubes with different dilutions of the patient's serum.
- Add Salmonella antigens (O and H) to each tube and thoroughly mix.
- Incubate the tubes at 37°C for 2-4 hours.
- Examine for agglutination either through microscopy or visual inspection, which indicates the presence of antibodies in the serum reacting with the Salmonella antigens.

Interpretation:

Antibody Titers	Interpretation
High titer of anti-O and anti-H antibodies (1:160 or higher)	Suggestive of current typhoid infection.
Rising titers between acute and convalescent samples	Indicates active infection
High titer of anti-O antibodies without a corresponding rise in anti-H antibodies	May indicate a past infection or vaccination

7.6 RHEUMATOID ARTHRITIS (RA) FACTOR

The Rheumatoid Factor (RF) test is used to detect the presence of antibodies against the Fc portion of IgG antibodies in the serum. RA is an autoantibody produced by the immune system in patients with autoimmune diseases such as rheumatoid arthritis.

Procedure:

- A blood sample is taken from the patient's arm vein.
- The serum is separated from the blood and placed on a special card with small wells or circles for mixing with reagents that react with RA factor antibodies.
- The card is then rotated for a specific duration to allow the reaction to take place.
- After rotation, the card is inspected for agglutination, with Positive and Negative controls included in the process.
- The test results are interpreted by a healthcare provider and may be used along with other diagnostic information.

Interpretation:

A positive result in the RA factor test suggests the presence of RA antibodies in the patient's serum, potentially indicating an autoimmune disorder like rheumatoid arthritis.

7.7 VDRL (Venereal Disease Research Laboratory):

The venereal disease research laboratory (VDRL) test is a nonspecific micro flocculation test for the screening of syphilis. It uses antigen-containing cardiolipin, lecithin, and cholesterol and measures both IgG and IgM antibodies to lipoidal and lipoproteins released as a result of damage to host cells and also to cardiolipin released from treponemes.

Principle:

The VDRL test is a nontreponemal test that detects the presence of antibodies in the blood that are produced in response to the presence of syphilis. The test is based on the principle of flocculation, where the antibodies in the serum of the patient cause the antigen-antibody complex to flocculate or clump together.

Procedure:

- Collect a blood sample from the patient.

- Separate the serum from the blood sample.
- Place the sample, along with positive and negative controls, in circles on the slide.
- Mix the serum with a cardiolipin-cholesterol-lecithin antigen.
- Observe the mixture for clumping or flocculation, indicating a positive result.
- Interpret the test results based on the presence or absence of clumping.

Interpretation:

A positive VDRL test result indicates the patient with syphilis.



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Hon. Sec. & CEO

VHS/HR/INTERNS/2023

30.11.2023

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Mr.ARAVINTH.A** (Reg.No.41737026), B.Sc (MLT) student of Sathyabama Institute of Science and Technology had done his internship in the Department of Laboratory for the period from 01.11.2023 to 30.11.2023 at our Institution.

We wish him all the best for his future endeavors.

For THE VOLUNTARY HEALTH SERVICES

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8. BLOOD BANK

INTRODUCTION:

A blood bank collects, separates, tests and stores blood until a patient needs it. If you've donated blood before, you've been part of the blood banking process.

The first blood bank in the United States was established in 1937 by Dr. Bernard Fantus at Cook County Hospital in Chicago. At the time, it was not possible to store blood for more than a few days. Most transfusions were person-to-person, a dangerous process which made it hard to find donors.

Hoping to solve this problem, Dr. Fantus began experimenting with ways to safely store blood. Initially called the Blood Preservation Laboratory, he changed the name to "blood bank" which was less likely to scare away potential donors. The ability to collect and store blood for an extended period of time revolutionized how doctors treated patients. Donating blood was no longer a high-risk process and patients in need had access to blood they needed for survival.

8.1 FUNCTIONS OF BLOOD BANK:

A certain set of standard tests are done in the lab once blood is donated, including, but not limited to, the following:

- Typing: ABO group (blood type)
- Rh typing (positive or negative antigen)
- Screening for any unexpected red blood cell antibodies that may cause problems in the recipient
- Screening for current or past infections, including:
 - Hepatitis viruses B and C
 - Human immunodeficiency virus (HIV)
 - Human T-lymphotropic viruses (HTLV) I and II
 - Syphilis
 - West Nile virus
 - Chagas disease

- Irradiation to blood cells is performed to disable any T-lymphocytes present in the donated blood.
- Leukocyte-reduced blood has been filtered to remove the white blood cells that contain antibodies that can cause fevers in the recipient of the transfusion.

8.2 BLOOD DONOR SELECTION AND REJECTION CRITERIA

- Age
- Weight
- Pulse rate
- Disease, disorder, inflammation
- Bp
- Meal
- Hb
- Health
- Compatibility
- Blood group
- Tube mismatch.
-

8.3 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) 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.



8.4 BLOOD DONOR REQUEST FORM:

- Name
- Identity
- Labelling
- Male/female
- Age
- Weight
- Height
- Pulse rate
- Hb
- Work place/college
- Mobile number
- Blood group
- Unit of blood collected
- Double bag/single bag

8.5 BLOOD DONATION:

Blood donation is a vital part of worldwide healthcare. It relates to blood transfusion as a life-sustaining and life-saving procedure as well as a form of therapeutic phlebotomy as a primary medical intervention.

Over one hundred million units of blood are donated each year throughout the world. This article will concisely discuss a short history of blood donation origin and purpose, blood testing, donor eligibility and selection, adverse effects of donation, blood donation as a primary medical intervention, and a brief discussion of pathogen reduction and inactivation for donated blood.

Blood donation for transfusion is a vital step in the management of many clinical problems, with the two primary indications being anaemia and acute blood loss. Blood donation itself is also used to primarily treat a small subset of medical conditions.

At the beginning of the 20th century, Karl Landsteiner identified ABO blood groups, at which time blood typing of individuals was only beginning to be adopted as a universally standard practice. Due to the inability to prevent blood from clotting once removed from the donor and thus store and transfer blood to be delivered when needed later, transfusions were only carried out on a limited basis.

Blood was transfused directly from donor to recipient without intervening storage or transport. This method worked for small numbers of patients and only on a small scale, as donors and recipients needed to be connected both in time and space. There was a time when lists of donors were maintained of persons locally available to be called in to donate to patients at any time as needed. Necessity drove the development of more flexible donation and storage practices when World War I began. "On-demand" blood donation was not feasible for such a large scale effort. Soldiers were dying of otherwise non-fatal wounds due mainly to the inability to perform a timely blood transfusion.

Concerted efforts to develop a means of storing and transferring blood to meet the war-time demands led to several discoveries. One, clotting was inhibited by adding citrate to the donated blood. Second, glucose was added to the solution to allow the red blood cells to remain viable for several weeks when stored in refrigerated conditions. The first-time blood was "banked" as is common practice currently, was when Captain Oswald Hope Robertson of the US Army Medical Corps collected Group O blood, combined it with glucose, and stored it before the Battle of Cambrai in November 1917. This was a pivotal shift from the prior practices of "direct" blood donation to "indirect" blood donation, importantly separating donors from their recipients geographically and temporally. This development made blood donation and transfusion a much more practical and useful medical intervention.

8.6 DONOR COUNSELING:

Donor counselling is a confidential dialogue between a blood donor and a trained counsellor about issues related to the donor's health and the donation process; it may be provided before, during and after blood donation. There are benefits for both the and the wider health system in implementing blood donor counselling. It minimizes the unnecessary loss of suitable

donors while maximizing the retention of donors, including those who are temporarily deferred.

The counselling is an important means of promoting healthy lifestyles and makes an important contribution to individual and community health. In addition, counselling contributes to the early diagnosis and treatment of conditions such as anaemia, blood disorders and infections. This offers a crucial early entry point for the treatment and care of donors found to be infected and may contribute to delaying or preventing the development of full-blown disease or complications. This duty of care extends beyond donors themselves to their families and the general population as these individuals may infect others if they are not aware of their infection status. Donor counselling thus contributes to the continuum of care in the health system, plays an important role in preventing the further transmission of infections, contributes to the containment of epidemics and reduces the disease burden on the national health system.

8.7 BLOOD GROUPING:

The discovery of the ABO blood group, over 100 years ago, caused great excitement. Until then, all blood had been assumed to be the same, and the often tragic consequences of blood transfusions were not understood. As our understanding of the ABO group grew, not only did the world of blood transfusion become a great deal safer, but scientists could now study one of the first human characteristics proven to be inherited. A person's ABO blood type was used by lawyers in paternity suits, by police in forensic science, and by anthropologists in the study of different populations.

The ABO blood group antigens remain of prime importance in transfusion medicine—they are the most immunogenic of all the blood group antigens. The most common cause of death from a blood transfusion is a clerical error in which an incompatible type of ABO blood is transfused. The ABO blood group antigens also appear to have been important throughout our evolution because the frequencies of different ABO blood types vary among different populations, suggesting that a particular blood type conferred a selection advantage (e.g., resistance against an infectious disease.)

However, despite their obvious clinical importance, the physiological functions of ABO blood group antigens remain a mystery. People with the common blood type O express neither the A nor B antigen, and they are perfectly healthy. Numerous associations have been

made between particular ABO phenotypes and an increased susceptibility to disease. For example, the ABO phenotype has been linked with stomach ulcers (more common in group O individuals) and gastric cancer (more common in group A individuals). Another observation is that individuals with blood type O tend to have lower levels of the von Willebrand Factor (vWF), which is a protein involved in blood clotting.

8.8 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. Laboratory screening for TTIs should be performed on blood samples collected at the time of donation. All tests on blood samples should be performed and recorded in accordance with standardized procedures in laboratories that are properly equipped to undertake them.

All blood samples, donations and components should be correctly labelled to ensure correct identification throughout the screening process. They should also have appropriate, validated systems for linking all test results to the correct donations and donors so that donors' records can be reviewed each time they come to donate. These systems will ensure that the correct results are allocated to each donation and prevent errors resulting in the transfusion of an unsafe unit.

8.9 COMPONENT SEPARATION:

The whole blood which is a mixture of cells, colloids and crystalloids can be separated into different blood components namely packed red blood cell (PRBC) concentrate, platelet concentrate, fresh frozen plasma and cryoprecipitate. Each blood component is used for a different indication; thus, the component separation has maximized the utility of one whole blood unit. Different components need different storage conditions and temperature requirements for therapeutic efficacy. A variety of equipment's to maintain suitable ambient conditions during storage and transportation are in vogue. The blood components being foreign to a patient may produce adverse effects that may range from mild allergic manifestations to fatal reactions. Such reactions are usually caused by plasma proteins, leucocytes, red cell antigens, plasma and other pathogens. To avoid and reduce such complications, blood products are modified as leuko reduced products, irradiated products,

volume reduced products, saline washed products and pathogen inactivated products. The maintenance of blood inventory forms a major concern of blood banking particularly of rare blood groups routinely and common blood groups during disasters. PRBCs can be stored for years using cryopreservation techniques. New researches in red cell cultures and blood substitutes herald new era in blood banking.

8.10 STORAGE AND SHELF LIFE:

Shelf life:

Whole blood-35days

PRBC-35-42days

FFP-1 year

Platelet-5days

Cryoprecipitate



8.11 BLOOD ISSUING

- Identification number
- Date and time of issuing
- Grouping of blood
- Compatibility
- Person's identity for issuing.

8.12 CROSS MATCHING:

Blood cross matching is a series of tests that are done before a blood transfusion is performed. These tests ensure that the blood is compatible between the person giving it and the person receiving.

If the blood isn't good match for you, blood crossmatching helps to find blood that is close to your own for it to be a success. If the blood isn't good match, your immune system could reject the donated blood, thinking that it is a foreign invader looking to harm your body. Your immune system could then create antibodies that fight against the new blood cells. This could cause a dangerous reaction.

Blood crossmatching is also called blood typing or compatibility test. Several tests are required to complete this process. The first test is blood typing which tells you blood type. This test also shows whether your Rh blood type is positive or negative.

There are 4 blood groups:

- AB
- A
- B
- O

8.13 BLOOD BANKING RECORDS:

- Recipient's Rh group
- Identification number and name of 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
- Name and identification number
- Volume and potency
- Dosage
- Visual inspection
- Date and time of issue



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**Madras Egmore
Lions Blood Bank &
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Date: 12th Dec 2022

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This is to certify that Mr. Aravinth. A, 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. He 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 28th Nov 2022 to 3rd Dec 2022.

During his internship, performance was good and he was able to complete the project on time.

We wish him all the best for his 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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9. CONCLUSION:

During my internship at Lions blood bank and Voluntary health services, I have gained extensive knowledge in compatibility testing, blood grouping, screening, plasma grouping, microbiology, different staining techniques and more. I'm grateful for the guidance and have gained practical knowledge .



Lions Blood bank, Ambattur



VHS, Adyar



At Voluntary Health Services, Adyar

