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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)

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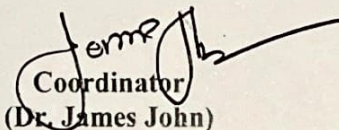
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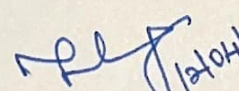
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BONAFIDE CERTIFICATE

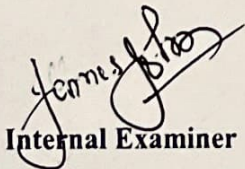
This is to certify that this internship report is the bonafide work of **OVIYA M.S(41737010)** who have done carried out the training program at **LIONS BLOOD BANK AND RESEARCH FOUNDATION** at Egmore and **CHENGALPATTU MEDICAL COLLEGE** at **CHENGALPATTU** under our supervision from August 2023 to April 2024.

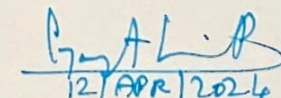

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DECLARATION

I, Ms. OVIYA M.S (41737010) hereby declare that the internship trainings done by me at “CHENGALPATTU MEDICAL COLLEGE-CHENGALPATTU” under the guidance of Dr. JAMES JOHN and “EGMORE LIONS BLOOD BANK AND RESEARCH FOUNDATION- EGMORE” under the guidance of Ms. D. JASMINE PRIYA 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 : 12.04.24

Place : CHENNAI

M.S. Oviya

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

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1. INTROUCTION

I am worked in the CHENGALPATTU MEDICAL COLLEGE - CHENGALPATTU DISTRICT, Histopathology and microbiology laboratory during my internship training period on 01st November 2023 to 30th November 2023 from 10am to 4pm and I also worked in **EGMORE LIONS BLOOD BANK AND RESEARCH FOUNDATION- EGMORE.**

2. HISTOPATHOLOGY

In Histopathology laboratory, I learned about techniques and procedure of tissues examination for diagnose the diseases from the biopsy of the patients

2.1 SPECIMEN ACCESSIONING:

Histopathology specimen accessioning is a crucial step in the process of examining tissue samples for diagnosis. Here's a detailed overview of what it involves:

1.Receipt Of Specimens: Upon arrival at the pathology laboratory, specimens are received either from surgical procedures, biopsies, or autopsies.

2.Documentation: Each specimen is accompanied by relevant paperwork, such as a requisition form, patient information, and clinical history. This information is carefully reviewed to ensure accuracy and completeness.

3.Labeling: Specimens are labeled with unique identifiers, including accession numbers and barcodes, to track them throughout the laboratory workflow accurately. Proper labeling is essential for maintaining sample integrity and preventing mix-ups.

4.Logging Information: The received specimens and associated data are logged into the laboratory information system (LIS) or a designated database. This includes recording patient demographics, specimen type, collection site, and any specific instructions from the healthcare provider.

5.Quality Check: A quality check is performed to verify that all necessary information is present and accurate. Any discrepancies or missing details are addressed promptly to avoid errors downstream.

6.Specimen Preparation: Depending on the type of specimen, it may undergo various preparation steps before analysis. This could include gross examination, tissue processing, embedding in paraffin blocks, sectioning, and staining.

7.Storage: Specimens are stored in designated areas with appropriate conditions to preserve tissue integrity until analysis is complete. Temperature, humidity, and other environmental factors are carefully controlled to prevent degradation.

8.Documentation of Handling: Each step of specimen handling, from accessioning to final disposition, is documented meticulously. This ensures a complete audit trail and facilitates traceability in case of inquiries or quality control purposes.

9.Communication: Throughout the accessioning process, communication channels are maintained with healthcare providers and other relevant stakeholders to relay any pertinent information and address concerns promptly.

10.Regulatory Compliance: All procedures related to specimen accessioning adhere to regulatory requirements, such as HIPAA (Health Insurance Portability and Accountability Act) regulations and laboratory accreditation standards.

By following these detailed procedures, histopathology laboratories ensure the accurate and efficient processing of tissue specimens, ultimately contributing to the delivery of high-quality diagnostic services for patients.



Figure-1.1SPECIMENS

2.2 GROSS EXAMINATION

Gross examination involves the macroscopic examination of tissue specimens to identify any abnormalities or pathological changes. Here's a detailed overview of the process:

1.Specimen Receipt: Specimens are received from the operating room, biopsy suite, or other sources and are accompanied by relevant paperwork, including a requisition form and patient information.

2.Documentation: The documentation accompanying the specimen is reviewed carefully to ensure accuracy and completeness. This includes verifying patient demographics, specimentype, collection site, and any clinical history provided.

3.Specimen Preparation: Before gross examination, specimens may undergo certain preparatory steps, such as rinsing with saline solution or fixation in formalin to preserve tissue integrity.

4.Gross Examination Setup: The specimen is placed on a clean, well-lit workspace, often a grossing station equipped with appropriate tools and supplies.

5.External Examination: The gross examination begins with an external inspection of the specimen. This involves noting the size, shape, color, and any visible abnormalities on the surface.

6.Dissection: If necessary, the specimen is dissected using scalpels, forceps, and scissors to expose internal structures. Care is taken to maintain anatomical orientation and to sample representative areas for further analysis.

7.Measurement: Dimensions of the specimen are measured and recorded accurately, including length, width, and thickness. This information helps pathologists assess tumor size and extent of involvement.

8.Sampling: Representative tissue samples are collected from various areas of the specimen for histological processing and microscopic examination. Special attention is given to areas of interest, such as lesions, tumors, or abnormal growths.

9.Description: A detailed description of the specimen's macroscopic features is recorded, including its overall appearance, color, consistency, and any notable characteristics observed during dissection.

10.Photography: Photographs may be taken before and after dissection to document the specimen's appearance and any significant findings for inclusion in the patient's medical record or for teaching purposes.

11.Communication: Pathologists may consult with other members of the healthcare team, such as surgeons or radiologists, to discuss findings or request additional studies for further evaluation.

12.Documentation and Reporting: All findings from the gross examination are documented in the pathology report, along with microscopic observations and diagnostic interpretations. The report is then communicated to the referring physician for patient management decisions.

By meticulously performing gross examinations, histopathologists gather essential information to guide diagnosis, prognosis, and treatment planning for patients with various medical conditions.



Figure-1.2 **GROSS STATION**

2.3 TISSUE FIXATION

Tissue fixation is a critical step in histopathology that preserves tissue structure and prevents decay or degradation. Here's a detailed overview of the process

1.Purpose: The primary goal of tissue fixation is to maintain the structural integrity of biological tissues by preventing autolysis (self-digestion) and putrefaction (decay). Fixation also helps to halt metabolic processes, stabilize cellular components, and prepare tissues for further processing and analysis.

2.Selection of Fixative: Various fixatives are available, each with specific properties and applications. Common fixatives include formaldehyde (formalin), glutaraldehyde, alcohol-based solutions (e.g., ethanol, methanol), and proprietary formulations like Bouin's solution or Carnoy's solution. The choice of fixative depends on factors such as the type of tissue, desired preservation quality, downstream applications (e.g., histology, immunohistochemistry), and regulatory requirements.

3.Specimen Preparation: Before fixation, tissues are usually trimmed to an appropriate size to facilitate penetration of the fixative and ensure uniform fixation. Large specimens may be sectioned into smaller pieces to improve fixation efficiency.

4.Fixative Penetration: Tissues are immersed in the chosen fixative solution, ensuring complete coverage and submersion. Fixatives penetrate tissues through diffusion, with factors such as tissue thickness, density, and vascularization influencing the rate and depth of penetration. To enhance penetration, tissue sections may be gently agitated or subjected to vacuum-assisted methods.

5.Fixation Time: The duration of fixation varies depending on the fixative used, tissue type, and specimen size. Typically, fixation times range from a few hours to 24-48 hours, with larger or denser tissues requiring longer fixation periods. Over-fixation can lead to tissue hardening and loss of antigenicity, while under-fixation may result in inadequate preservation and tissue damage.

6.Temperature and pH Control: Fixation is often performed at room temperature or slightly elevated temperatures to optimize fixative activity and minimize **tissue damage**. The pH of the fixative solution is also critical, as it affects the stability of cellular components and the efficiency of cross-linking reactions. Buffers such as phosphate-buffered saline (PBS) or HEPES may be used to maintain optimal pH conditions.

7.Safety Precautions: Fixatives such as formaldehyde and glutaraldehyde are hazardous chemicals and require careful handling to minimize exposure risks. Safety protocols, including the use of personal protective equipment (PPE), fume hoods, and proper ventilation, should be followed to ensure laboratory safety and compliance with regulatory guidelines.

8.Washing and Neutralization: After fixation, tissues may be rinsed with buffer solutions or water to remove excess fixative and neutralize residual chemicals. This step helps to reduce potential artifacts and minimize interference with downstream analyses.

9.Storage: Fixed tissues can be stored for varying lengths of time, depending on the fixative used and storage conditions. Properly fixed and stored tissues retain their structural integrity and are suitable for subsequent processing steps, such as tissue processing, embedding, sectioning, and staining.

By carefully controlling the tissue fixation process, histopathologists ensure optimal preservation of tissue morphology and cellular architecture, facilitating accurate histological examination and diagnostic interpretation.



Figure-1.3 TISSUE FIXATIVE

2.4 TISSUE PROCESSING

Tissue processing refers to a series of steps used to prepare biological tissues for microscopic examination. There are several methods of tissue processing, each serving different purposes. Here are some of the common types:

1.Fixation: This is the initial step in tissue processing where tissues are preserved and stabilized to prevent degradation. Common fixatives include formalin, glutaraldehyde, and alcohol.

2.Dehydration: After fixation, tissues are dehydrated to remove water and replace it with a medium that can penetrate the tissue. This is typically done by soaking the tissue in a series of alcohol solutions of increasing concentration.

3.Clearing: Dehydrated tissues are often opaque due to the alcohol used for dehydration. Clearing involves replacing the alcohol with a substance such as xylene or benzene to make the tissue transparent, allowing for better visualization under a microscope.

4.Embedding: In this step, the dehydrated and cleared tissues are embedded in a solid medium, usually paraffin wax or acrylic resins. Embedding provides support for the tissue during sectioning and allows for thin sections to be cut.

5.Sectioning: Embedded tissues are sliced into thin sections using a microtome. The thickness of the sections depends on the type of analysis to be performed. Thin sections are typically used for routine histology, while thicker sections may be used for special staining or other techniques.

6.Mounting: Thin sections are mounted onto microscope slides and allowed to adhere to the surface. This is often done using adhesive substances like albumin or gelatin.

7.Staining: Staining is the final step in tissue processing and involves applying dyes or stains to the tissue sections to enhance contrast and visualize specific structures or cellular components. There are numerous staining techniques available, including hematoxylin and eosin (H&E) staining, immunohistochemistry (IHC), and special stains for specific tissues or structures.

Each of these steps is crucial for preparing tissue samples for microscopic examination and analysis in fields such as pathology, histology, and research. The choice of processing methods depends on the specific requirements of the experiment or diagnostic procedure.



Figure-1.4 TISSUE PROCESSING

2.5 TISSUE EMBEDDING

Tissue embedding is a critical step in tissue processing that involves embedding biological tissue samples into a solid medium to provide support for thin sectioning and subsequent microscopic examination. Here's a detailed explanation of the tissue embedding process:

1 Dehydration and Clearing: Before embedding, the tissue samples undergo dehydration to remove water and clearing to make them transparent. This typically involves soaking the samples in a series of alcohol solutions to replace water, followed by immersion in a clearing agent such as xylene or benzene to remove the alcohol and make the tissue transparent.

2. Infiltration: After dehydration and clearing, the tissue samples are infiltrated with a liquid embedding medium. The most commonly used embedding medium is paraffin wax, although acrylic resins or other synthetic materials may also be used. Infiltration ensures that the embedding medium fully penetrates the tissue, providing support and preserving the tissue's structural integrity during sectioning.

3. Molding: Once infiltrated, the tissue samples are placed into molds filled with molten embedding medium. The molds are typically made of metal or plastic and come in various shapes and sizes to accommodate different sample sizes and shapes. The tissue samples are oriented in the desired orientation within the mold to ensure proper sectioning later on.

4. Cooling and Solidification: After molding, the embedding medium is allowed to cool and solidify, encasing the tissue samples within a solid block of wax or resin. This step ensures that the tissue samples are securely held in place and will not move or become distorted during sectioning.

5. Trimming: Once the embedding medium has solidified, the blocks are trimmed to remove excess wax or resin and to expose the tissue samples for sectioning. Trimming is typically done using a microtome or a specialized trimming tool to ensure clean and precise cuts.

6. Sectioning: The embedded tissue blocks are mounted onto a microtome, which is a precision cutting instrument used to produce thin sections of tissue. The microtome allows for

precise control over the thickness of the sections, which can range from a few micrometers to several millimeters, depending on the specific requirements of the experiment or analysis.

7.Mounting on Slides: Once the tissue sections have been cut, they are carefully lifted onto microscope slides using specialized tools such as brushes or needles. The sections are then allowed to adhere to the surface of the slides, often by briefly heating them on a hotplate or passing them through a flame.

8.Staining and Analysis: Finally, the tissue sections are stained using various dyes or stains to enhance contrast and visualize specific structures or cellular components. The stained slides are then examined under a microscope to analyze the tissue morphology, identify abnormalities, or conduct further research.

Overall, tissue embedding is a critical step in tissue processing that allows for the preparation of thin sections of biological tissue for microscopic examination and analysis. Proper embedding ensures that tissue samples are securely held in place and well-preserved, allowing for accurate and reliable results in various fields such as pathology, histology, and research.



Figure 1.5 EMBEDDING MACHINE

2.6 TISSUE SECTIONING

Tissue sectioning is a crucial technique in histology and pathology for preparing thin slices of biological tissue samples for microscopic examination. Here's a detailed overview of the process:

1.Tissue Fixation: The first step is to obtain the tissue sample and fix it to preserve its structure and cellular components. Common fixatives include formaldehyde or paraformaldehyde.

2.Dehydration: The fixed tissue is dehydrated using a series of alcohol solutions (e.g., ethanol) to remove water from the tissue gradually. This helps to prevent tissue damage during subsequent processing.

3.Clearing: Following dehydration, the tissue is cleared using a clearing agent such as xylene or toluene. This step removes the alcohol and prepares the tissue for embedding in a solid medium.

4.Embedding: The tissue is embedded in a support medium, typically paraffin wax or resin, to provide stability during sectioning. The tissue is placed in a mold, surrounded by melted embedding medium, and allowed to solidify.

5.Sectioning: Once the embedding medium has solidified, the tissue block is trimmed to the desired size and shape for sectioning. A microtome, which is a precision cutting instrument, is used to cut thin sections of the tissue block. The thickness of the sections can vary but is typically between 5 to 10 micrometers for light microscopy.

6.Mounting: The thin tissue sections are carefully transferred onto glass slides and allowed to adhere. A warm water bath or adhesive may be used to help the sections adhere to the slides.

7.Staining: Tissue sections are often stained to enhance contrast and visualize specific structures or cells. Common stains include hematoxylin and eosin (H&E), which stains nuclei blue and cytoplasm and extracellular structures pink.

8.Cover slipping: After staining and drying, a coverslip is placed over the tissue section using mounting medium to preserve the sample and provide optical clarity for microscopy.

9.Microscopic Examination: Finally, the prepared slides are examined under a microscope to analyze the tissue morphology, cellular structure, and any abnormalities.

Each step in tissue sectioning requires precision and careful handling to ensure the integrity of the tissue sample and obtain high-quality results for accurate interpretation.



Figure 1-6 SECTION CUTTING

2.7 SLIDE STAINING

Slide staining is a crucial technique in laboratory settings, particularly in fields like biology, pathology, and histology, where it's used to enhance the visibility of cellular structures and components under a microscope. Here's a detailed overview of the process:

1.Preparation of Specimen: Before staining, specimens (cells, tissues, or microorganisms) are typically fixed onto microscope slides using various methods like heat fixation, chemical fixation (e.g., formaldehyde), or freezing.

2.Selection of Stain: Different stains target specific cellular structures or components. Common stains include hematoxylin and eosin (H&E), which highlight nuclei and cytoplasm respectively, and Gram stain, which differentiates bacteria based on cell wall composition.

3.Fixation: The specimen on the slide is often treated with a fixative to preserve its structure and prevent degradation. Common fixatives include formaldehyde or alcohol-based solutions.

4.Staining Procedure:

- a. Deparaffinization and Rehydration: If the specimen is embedded in paraffin wax, it needs to be removed before staining. This is done by immersing the slides in xylene or a xylene substitute followed by a series of alcohol washes to rehydrate the tissue.
- b. Staining: The prepared slides are immersed in the staining solutions. This can involve one or multiple staining steps depending on the stain used and the desired contrast.
- c. Washing: After staining, excess stain is rinsed off using distilled water or a buffer solution to remove any unbound dye.
- d. Counterstaining: In some cases, a counterstain is applied to provide contrast to the primary stain. For example, in Gram staining, a counterstain like safranin is used.
- e. Dehydration: Once staining is complete, the slides may be dehydrated using a series of alcohol washes to remove excess water and prepare them for mounting.
- f. Clearing and Mounting: The slides may be cleared using a clearing agent like xylene to remove any remaining alcohol and then mounted with a coverslip using a mounting medium to preserve the specimen and prevent distortion.

5. Microscopic Examination: Finally, the stained slides are examined under a microscope to observe and analyze the cellular structures and components.

It's crucial to follow specific protocols and techniques for each stain to ensure accurate and reproducible results. Additionally, proper safety precautions should be observed when handling staining reagents, as some may be toxic or hazardous.

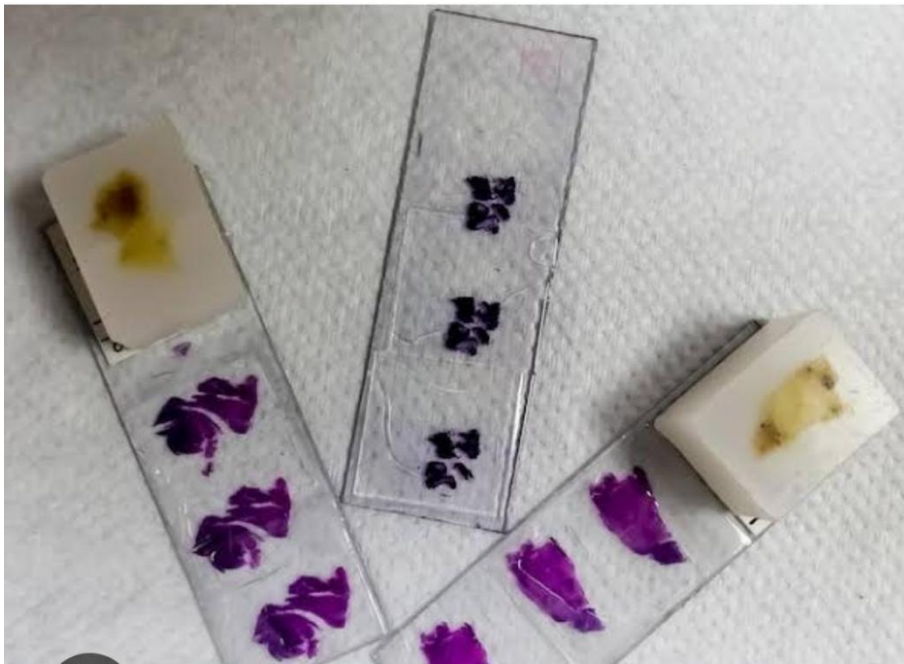


Figure 1.7 STAINING SLIDE

3. MICROBIOLOGY

In microbiology laboratory, I learned about procedure of staining and preparation of media .

3.1 MEDIA PREPARATION

CLED AGAR:

CLED agar, which stands for Cystine-Lactose-Electrolyte-Deficient agar, is a selective medium used for the isolation and differentiation of urinary tract pathogens. Here's a general protocol for preparing CLED agar:

Ingredients:

- CLED agar powder
- Distilled water
- Autoclave
- Procedure:

1. Weigh out the appropriate amount of CLED agar powder according to the manufacturer's instructions.

2. Dissolve the CLED agar powder in distilled water in a suitable container, such as a flask or beaker.

3. Stir the mixture until the powder is completely dissolved.

4. Adjust the pH of the solution to around 7.3 using a pH meter or pH indicator strips. This step is critical for the performance of the medium.

5. Once the pH is adjusted, dispense the solution into containers such as petri dishes or tubes.

6. Autoclave the containers at 121°C for 15 minutes to sterilize the medium and ensure that it remains free from contaminants.

7. After autoclaving, allow the medium to cool down to around 45-50°C before pouring it into petri dishes or tubes for solidification.

8. Once solidified, the CLED agar plates or tubes are ready to use for bacterial culture.

It's essential to follow proper aseptic techniques during the preparation process to prevent contamination of the medium. Additionally, ensure that the medium is stored properly after preparation to maintain its integrity and effectiveness.

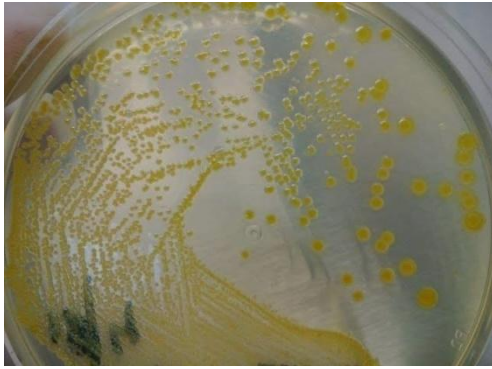


Figure 1.8 CLED AGAR

BLOOD AGAR:

Ingredients:

- Blood agar base powder
- Sheep blood (or other appropriate animal blood)
- Distilled water
- Autoclave

Procedure:

1. Weigh out the appropriate amount of blood agar base powder according to the manufacturer's instructions.
2. Dissolve the blood agar base powder in distilled water in a suitable container, such as a flask or beaker, according to the manufacturer's instructions.
3. Heat the mixture while stirring until the powder is completely dissolved.
4. Sterilize the solution by autoclaving at 121°C for 15 minutes.
5. After autoclaving, allow the medium to cool down to around 45-50°C.
6. Aseptically add sterile defibrinated sheep blood (or other appropriate animal blood) to the agar base. The recommended concentration of blood is typically 5-10% but may vary depending on the application.
7. Mix the blood and agar base thoroughly but gently to ensure even distribution.
8. Pour the mixture into petri dishes or tubes for solidification.
9. Once solidified, the blood agar plates or tubes are ready to use for bacterial culture.

It's crucial to maintain sterile conditions during preparation to prevent contamination of the medium. Additionally, ensure that the blood used is fresh and not hemolyzed for optimal results

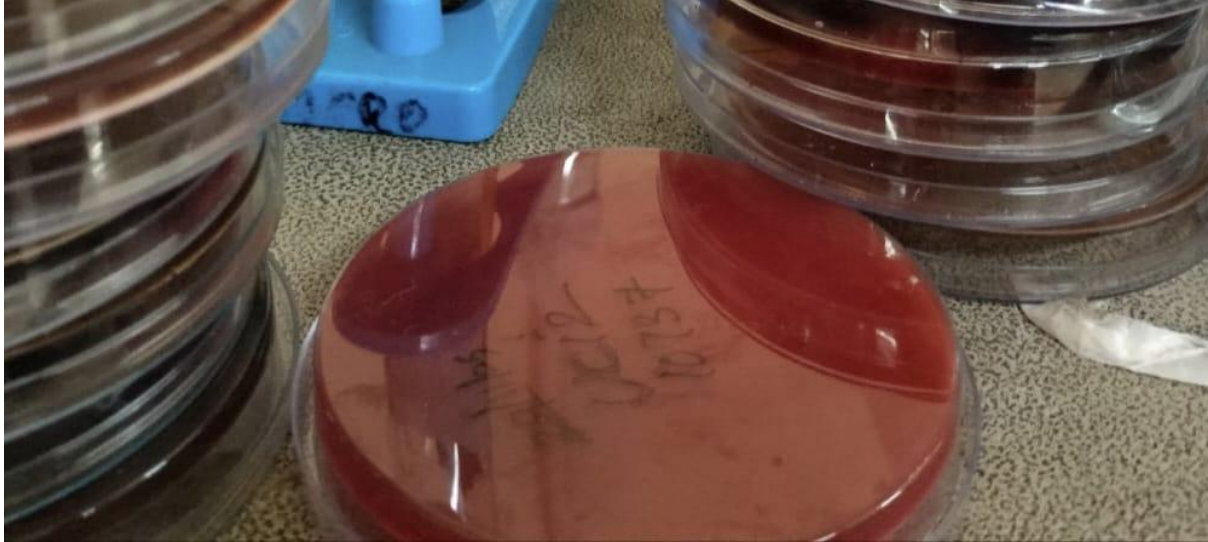


Figure 1.9 BLOOD AGAR

CHOCOLATE AGAR:

Chocolate agar, also known as heated blood agar or chocolate blood agar, is a type of nutrient medium used for the cultivation of fastidious bacteria, particularly *Haemophilus influenzae* and *Neisseria* species. Here's a general protocol for preparing chocolate agar:

Ingredients:

- Blood agar base powder
- Distilled water
- Heat source (such as a water bath or hot plate)

Procedure:

1. Weigh out the appropriate amount of blood agar base powder according to the manufacturer's instructions.

2. Dissolve the blood agar base powder in distilled water in a suitable container, such as a flask or beaker, following the manufacturer's instructions.
3. Heat the mixture gently until the powder is completely dissolved. Avoid boiling, as excessive heat can degrade the blood components.
4. Sterilize the solution by autoclaving at 121°C for 15 minutes.
5. After autoclaving, allow the medium to cool down to around 45-50°C.
6. Prepare fresh defibrinated sheep blood or other appropriate animal blood.
7. Aseptically add the sterile blood to the agar base. The recommended concentration of blood is typically 5-10% but may vary depending on the application.
8. Mix the blood and agar base thoroughly but gently to ensure even distribution.
9. Once mixed, pour the agar into petri dishes or tubes for solidification.
10. Place the plates or tubes in a 37°C incubator for several hours to allow the chocolate agar to set completely.

Chocolate agar is called so because after preparation, it has a chocolate-brown appearance due to the heating and lysing of red blood cells. It provides the necessary nutrients and factors for the growth of fastidious bacteria, making it an essential medium in microbiology laboratories.



Figure 1.10 CHOCOLATE AGAR

3.2 CULTURE

Culture preparation can refer to various processes depending on the context, such as preparing a bacterial culture in a laboratory, cultivating a culture of teamwork within an organization, or fostering cultural understanding between different communities.

Since you didn't specify the context, I'll provide a brief overview of preparing a bacterial culture in a laboratory:

1.Gather Materials: Collect sterile equipment including Petri dishes, agar media, bacterial inoculum, sterile swabs or loops, and an incubator.

2.Preparation of Agar Plates: Prepare the agar medium according to the manufacturer's instructions or by following a specific recipe. Sterilize the agar solution and pour it into Petri dishes. Allow the agar to solidify.

3.Inoculation: Use a sterile swab or loop to transfer the bacterial sample onto the agar plate. Streak the plate in a specific pattern (e.g., quadrant streaking) to isolate individual colonies.

4.Incubation: Place the inoculated agar plates in an incubator set to the appropriate temperature and conditions for the bacteria being cultured. This allows the bacteria to grow and form visible colonies.

5.Monitoring: Check the plates periodically for bacterial growth. Depending on the type of bacteria, growth may occur within hours to days.

6.Sub-culturing: If necessary, transfer individual colonies to fresh agar plates to obtain pure cultures or perform further tests.

7.Documentation: Record relevant information such as the date of inoculation, type of bacteria, and any observations about colony morphology or growth characteristics.

8.Proper Disposal: Dispose of used materials properly according to laboratory protocols to prevent contamination and ensure safety.

This process ensures the successful growth and isolation of bacterial cultures for various laboratory applications, such as microbiological research, medical diagnostics, and biotechnology. If you meant a different type of culture preparation, please provide more details for a tailored response.



Figure 1.11 CULTURE AREA

3.3 SEROLOGY

Antibody serology test check for the presence or level of specific antibody in the blood. Antibodies are protein that your immune system make to fight foreign substances. These substances are often pathogens such as virus bacteria.

ELISA:

ELISA, or Enzyme-Linked Immunosorbent Assay, is a widely used technique in immunology for detecting the presence of specific proteins, antibodies, antigens, or other molecules in a sample. Here's a detailed overview of the ELISA method:

1.Coating the Plate:

A microtiter plate (usually made of polystyrene) is coated with a capture molecule, such as an antibody or antigen, specific to the target molecule you want to detect.

The plate is typically washed to remove any unbound molecules.

2.Blocking:

After coating, the plate is treated with a blocking agent (like BSA or milk) to prevent nonspecific binding of other molecules to the plate surface. This step helps to reduce background noise.

3.Sample Incubation:

The sample containing the target molecule is added to the plate and allowed to incubate.

If the target molecule is present in the sample, it will bind to the capture molecule immobilized on the plate.

4.Washing:

After incubation, the plate is washed several times with a buffer solution to remove any unbound sample components.

5.Detection:

A detection molecule is added, which specifically binds to the target molecule. This molecule is usually an enzyme-linked antibody or antigen.

Common enzymes used in ELISA include horseradish peroxidase (HRP) and alkaline phosphatase (AP).

6.Washing:

The plate is washed again to remove any unbound detection molecules.

7.Substrate Addition:

A substrate specific to the enzyme used is added to the plate.

When the enzyme reacts with the substrate, it produces a detectable signal. This can be a color change, luminescence, or fluorescence depending on the substrate used.

8.Signal Measurement:

The intensity of the signal is measured using a microplate reader.

The amount of signal generated is directly proportional to the amount of target molecule present in the sample.

9.Data Analysis:

The data obtained from the microplate reader is analyzed to determine the concentration of the target molecule in the sample.

This is usually done by comparing the absorbance or fluorescence intensity of the sample to a standard curve generated using known concentrations of the target molecule.

ELISA is a versatile and sensitive technique used in various fields, including clinical diagnostics, research, and drug development, due to its ability to detect and quantify specific molecules with high specificity and sensitivity.



Figure 1.12 ELISA KIT

WIDAL TEST:

The Widal test is a laboratory procedure used to diagnose typhoid fever, caused by the bacterium *Salmonella typhi*. Here's a detailed overview of the procedure:

1.Sample Collection: Blood is collected from the patient usually during the first week of illness, as this is when the antibodies start to develop. The blood sample is then sent to the laboratory for analysis.

2.Preparation of Antigen: In the laboratory, the specific strains of *Salmonella typhi* are cultured and then killed. The resulting bacterial suspension is the antigen used in the test.

3.Testing Serum: The patient's blood serum is separated from the blood cells. This serum contains antibodies produced by the immune system in response to the *Salmonella typhi* bacteria.

4.Serial Dilution: The serum is diluted in a series of test tubes or wells, typically in a 1:20, 1:40, 1:80, and 1:160 dilution series. This is done to reduce the concentration of antibodies for more accurate results.

5.Mixing with Antigen: Each diluted serum sample is mixed with the *Salmonella typhi* antigen. If the patient has antibodies to *Salmonella typhi*, they will react with the antigen.

6.Incubation: The test tubes or wells are then incubated at a specific temperature for a certain period to allow any reactions between the antibodies and the antigen to occur.

7.Interpretation of Results: After incubation, the test results are interpreted based on the presence and level of agglutination (clumping) of the bacteria-antibody complexes. Agglutination indicates a positive reaction, suggesting the presence of antibodies to *Salmonella typhi* in the patient's serum.

8.Titration: The highest dilution of serum that still shows agglutination is recorded. This is known as the Widal titer and is used to determine the severity of the infection. A higher titer suggests a more significant immune response and may indicate a more severe or recent infection.

9.Reporting: The results are reported as the highest dilution showing agglutination for each of the antibodies tested (e.g., O antigen, H antigen). A positive result is typically considered significant if it exceeds a certain threshold, which may vary depending on the laboratory's protocols and the patient's clinical presentation.

It's important to note that the Widal test has limitations and can produce false-positive or false-negative results, especially in areas where typhoid fever is endemic or in patients who have been previously vaccinated against *Salmonella typhi*. Therefore, it's often used in conjunction with other diagnostic methods, such as blood cultures or molecular tests, for confirmation.



Figure 1.13 WIDAL KIT

4. BLOOD BANKING:

What is blood banking?

Blood banking is process that take place in the lab to make sure that donated blood, or blood product are safe before they are used in blood transfusion and other medical procedure. Blood banking includes typing the blood for transfusion and testing for diseases

What are the function of blood banking?

A blood bank collects ,separates, tests ,and stores blood until paitent need it . if you have donated blood before ,you have been part of the blood banking process . the first blood bank in the untied state was established in 1937 by Dr .Bernard Fantus at cook country hospital in Chicago

- Collection, preservation, and distribution of the blood and blood component
- Teaching, Training and research.
- Clinical and therapeutic Function like transfusion and day care service .
- Recruitment of donors and maintenance of donor's record.

4.1 BLOOD DONOR SELECTION AND REJECTION CRITERIA:

SELECTION CRITERIA:

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

- Age between 18 -60 years
- Hemoglobin –not less than 12.5 g/ Dl
- Pulse – between 50 and 100/ minutes with no irregularities
- Blood pressure – systolic 100 -180 mm Hg and Diastolic 50-100 mm Hg
- Temperatures-normal (oral temperature not exceeding 37.50c)
- Body weight- not less than 45 kg
- Women should not be pregnant or breast feeding her child
- Women donor should not donate during menstrual cycle
- Ever had t b , bronchial asthma ,or allergic disorder, liver diseases, kidney diseases, fits and ,purple spot on skin or mucous membrane .
- Health condition- the donor should be in a healthy state mind and body

REJECTION CRITERIA:

- Affected with HIV virus or AIDS
- If the patient had undergone any open surgery
- When lady is pregnant
- Cancer patient ,kidney patient, TB Patient are not eligible
- Low hemoglobin anemic
- When tattoo
- Allergic
- High blood pressure
- Alcoholic
- Smoker
- Organ transplantation

4.2 BLOOD BAGS AND IT'S TYPES:

Blood bags are used for the reliable collection ,separation ,storage and transport of blood

Single blood bag:

Used for collection preservation, transfusion, of human blood



Figure 1.14 BLOOD BAG

Double blood bag:

Separate red blood cell and plasma .



Figure 1.15 DOUBLE BLOOD BAG

It includes a primary bag and satellite bag

Triple blood bag :

This system separate RBC, plasma puffy coat (includes leucocytes and platelets)

4.3 BLOOD DONOR REQUEST FORM:

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

BLOOD DONOR CONSENT FORM

LOCATION		DATE :	
குருதி கொடையாளர் பூர்த்தி செய்ய வேண்டியவரை TO BE FILLED BY DONOR		குருதி வங்கி ஊழியர் பூர்த்தி செய்ய வேண்டியவரை TO BE FILLED BY BLOOD BANK STAFF	
TYPE OF DONOR : VOLUNTARY REPLACEMENT தேதி / Date : பெயர் / Name : முகவரி / Address : பின்னஞ்சல் முகவரி / E-mail ID : கைபேசி எண் / Mobile No. : கல்வியறிவு (ஆ) அல்லது முகவரி / College or Company Address		Blood Group: HB: Sign of LT : TO BE FILLED BY MEDICAL OFFICER Pulse: BP: Temp: CVS: RS: Reason : Signature of Medical Officer	
பாலினம் / Gender: Male Female எடை / Weight: பிறந்த தேதி / Date of Birth: வயது / Age:		TYPE OF BLOOD BAG USED SINGLE DOUBLE TRIPLE QUADRUPLE Quantity : 350ml / 450ml BLOOD BAG NUMBER : SEGMENT NUMBER : BLOOD DONATION TIME : START TIME : END TIME : PHELEBOTOMIST	
இரத்த பிரிவு / Blood Group : கடைசியாக இரத்த தானம் செய்த தேதி / Last Donation Date : கொடுத்த இரத்த தானம் அளித்தது / Total No. of Donation : சாப்பிட்டு எத்தனை மணி நேரம் ஆகிறது? / When did you had your last meal?		கொடையாளர்களுக்கான வேண்டிய தகுதிகள் / Donor Eligibility Criteria வயது / Age : 18 - 65 Years எடை / Weight : >45 Kgs இரும்பு சத்து / Hemoglobin : 12.5 gms% நாடிக்குடிப்பு / Pulse : 60-100 / minute இரத்த அழுத்தம் / B.P. : 100 / 60 - 140/90 mm Hg	
நிரந்தர தடை / PERMANENT DEFERRAL			
1. உயர் இரத்த அழுத்தம் விளைவாக பக்கவாதம் ஏற்பட்டுள்ளதா? H/O Uncontrolled Blood Pressure / Stroke? 2. இதய நோய் சம்பந்தப்பட்ட மருந்துகள் உட்கொள்பவரா? H/O Heart Disease or Anti Arrhythmic? 3. வலியு சம்பந்தப்பட்ட / புற்றுநோய் மருந்துகள் உட்கொள்பவரா? H/O Epilepsy or Anticonvulsants or Cytotoxic drugs? 4. அதிக இரத்தப்போக்கு / கசிவு ஏற்பட்டுள்ளதா? H/O Abnormal bleeding tendencies / Enzyme Deficiencies with known history of Hemolysis ? 5. சர்க்கரை நோய் சம்பந்தப்பட்ட இன்கலின் மருந்துகள் உட்கொள்பவரா? H/O Diabetes mellitus or treatment with Insulin or Hypoglycemic drugs? 6. கல்லீரல் நோய் / மீட்டப்பட்ட கர்ப்ப நோய் / சிறுநீரக நெரிசு உள்ளவரா? H/O Chronic liver Disease or endocrine disorders / Chronic Kidney disease? 7. நரம்பு தளர்ச்சி / பக்கவாத நோய் உள்ளதா? H/O Parkinsons diseases? 8. கொதி சிறுநீர் நோய் நோய் சம்பந்தப்பட்ட விவாதிகள் அதுக்கு உண்டான மருந்துகள் உட்கொள்பவரா? H/O Psoriasis or treatment for the same? 9. மனநல மருத்துவ சிகிச்சை பெற்று இருக்கிறார்களா? H/O Psychiatric disorders / Schizophrenia? 10. சிறுநீரகம் / இடம் / கல்லீரல் / மூளை சம்பந்தப்பட்ட மிகப்பெரிய அறுவை சிகிச்சை நிகழ்ந்துள்ளதா? H/O Major surgeries for Kidney, Heart, Liver or Brain? 11. ஆலர்ஜிக் / அல்பி நோய் அறிகுறிகள் சிகிச்சை பெற்றுள்ளவரா? H/O severe allergic disorders or Asthmatic on steroid therapy? 12. மருந்து மருந்து / திருநெல் / பாலியல் நெரிசல் / ஓயிச்செருக்கை / பாலியல் நோய் / மட்டி உள்ளதா? H/O Injection Drug users / Transgender / Female Sex Workers / Persons with Multiple Sex Partners / Homosexual / STD / AIDS ? 13. மெக்டை நோய் / சிபிலிஸ் உள்ளவரா? H/O Gonorrhea Disease / Syphilis ? 14. கருவண்டிச்சை / தொகுநோய் உள்ளவரா? H/O Leishmaniasis disease / Leprosy 15. புற்றுநோய் பாதிக்கப்பட்டவரா / புற்றுநோய் அறுவை சிகிச்சை செய்யபவரா H/O Cancer disease / Surgery for cancer 16. Autoimmune diseases like SLE, RA, Ankylosing Spontylitis, Dermatomyositis, Scleroderma 17. முயற்சியுடன் இரத்த தானத்திற்கு பிறகு மயக்கமடைந்திருக்கிறா? H/O 2 Consecutive faints following a blood donation? 18. யாற்றிய அறுவை சிகிச்சை செய்தவரா? H/O Recipients of organ / System Cells / Tissue Transplant ?			

Figure 1.16 DONOR REQUEST FORM

4.4 BLOOD DONATION (PROCEDURE):

THE BLOOD DONATION PROCESS

The blood donation process from the time you arrive until the time you leave take about an hour . the donation itself is only about 8 – 10 minutes on averag

REGISTRATION

We will sign in and go over basic eligibility

You will be ask to show ID such as your driver license

Well ask you for your complete address

HEALTH HISTORY

You will answer a few question about health history and place you have traveled , during a private and confidential interview

We will check your temperature ,pulse, blood pressure, and hemoglobin

YOUR DONATION

If you are donating whole blood , well cleanse an area on your arm and insert a brand new sterile needle for the blood draw .this feel like a quick pinch and is over in second

Other type of donation such as platetes are made using an aphersris machine which will be connected to both arms

A whole blood donation takes 8 -10 mintues , during which you will be seated comfortably or lying down

When approximately a pint of whole blood has been collected , the donation is completed and a staff person will place a bandage on your arm

4.5 BLOOD DONOR CONSELLING:

Their duties include listening to patient , developing treatment plans, and creating coaching strategies.

- Motivate the donor at high risk to test for HIV
- Help the donor to take the right decision
- Create awareness among the donors on HIV AIDS and TTIs
- Encourage voluntary blood donor to donate regularly

4.6 BLOOD GROUPING:

PRINCIPLE :

Testing with both Anti – A and Anti –B is necessary to determine if red blood cells possess or lack A and / or B blood group antigens. Absence of agglutination is a negative test result, which indicates the corresponding antigen is not demonstrable. Agglutination of red blood cells with a given reagent is a positive test result, which indicates the presence of the corresponding antigen on the red blood cells.

The test to determine your blood group is called ABO typing. Your blood sample is mixed with antibodies against type A and B blood. Then the sample is checked to see whether or not the blood cells stick together, it means the blood reacted with one of the antibodies.



Figure 1.17 BLOOD GROUPING ANTIGENS

ABO blood grouping is based on the principle of an agglutination reaction. It is the popular method for blood group identification to determine the presence and absence of cellular antigens and their relative antibodies in the blood.

Procedure:

- First mix the patients blood with three different reagents including either of the three different antibodies. A , B or R h antibodies.
- Look for agglutination, then you take a look at what has happened,..
- Figure out the ABO blood group
- Figure out the R h blood group
- Figure out blood types

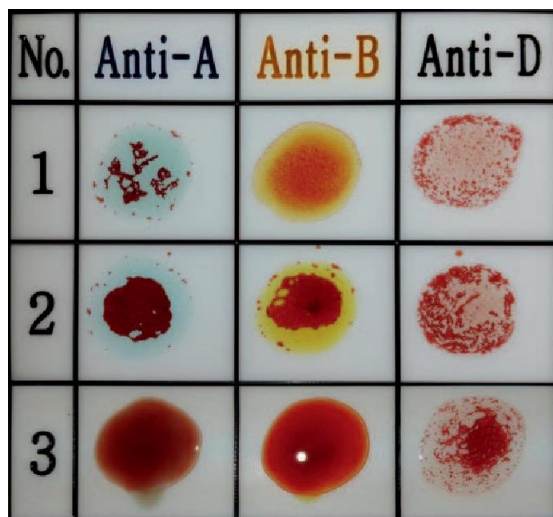


Figure 1.18 RH GROUPING

4.7 SCREENING TEST

HIV:

An antigen and antibody test performed by a lab on blood from a vein can usually detect HIV 18 to 45 days after exposure. There is also a rapid antigen and antibody test available test is done with a finger stick. Antigen and antibody test means you are protected against the hepatitis B virus.

Blood test can be detect signs of the hepatitis B virus in your body and tell you provider whether its acute Or chronic. A simple blood test can also determine. If you are immune to the condition. Liver ultrasound. A special ultrasound called transient elastography can show the amount of liver damage.



Figure 1.19 HIV KIT

HCV:

A blood test called an HCV antibody test, is used to find out if someone has ever been infected with the hepatitis C virus. The HCV antibody test, sometimes called the anti- HCV test, looks for antibodies to the hepatitis C virus in blood.

HPD:

Histrionic personalised disorder (HPD) Test is designed to see if you might have the symptoms of histrionic personality disorder. About 3% of adult will have histrionic personality disorder in their lifetime.

VDRL:

Screening test for syphilis . it measures substances (protein) called antibody , which your body may produces if you come in contsct with the bacteria that cause syphills.

MALARIA:

The DiaMED ELISA malaria antibody test is based on blinding of anti-plasmodium antibodies present in a serum sample to antigens immobilized on 96 well plates. The antigens are a mixture of a total extract of cultured plasmodium falciparum and recombinant plasmodium vivax .

4.8 COMPONENT SEPARATION

BLOOD COMPONENT:

- Whole blood
- Platelets
- Plasma
- Cryoprecipitate
- Packed red blood cell

PACKED RED BLOOD CELL:

Packed red blood cell from a donation of 450 ml of whole blood are obtained after centrifugation and plasma removal.



Figure 1.20 BLOOD COMPONENTS

FRESH FROZEN PLASMA:

Fresh frozen plasma obtained after centrifugation of whole blood and red cell removal or through direct separation

The plasma must be frozen within 8 hours after collecting in order to preserve coagulation factors and other plasma protein

Because plasma can be stored for a long time plasma is kept in until the donor comes back for a new donation so that he can be tested again for the infection diseases marker.



Figure 1.21 PLASMA

PLATELETS:

Platelets are mainly obtained through thrombapheresis .platelets product formerly obtained from a mix of more than 10 buffy coat can now be obtained from a single thromobapheresis of about 40 minutes

4.9 STORAGE OF BLOOD COMPONENT:

- Packed red blood cells: 2-6 degree celsius up to 42 days



Figure 1.22 STORAGE OF BLOOD COMPONENTS

- Fresh frozen plasma :30 degree celsius for up to 2 years



Figure 1.23 FRESH FROZEN PLASMA

- Platelets: 20 -24 degree celsius for 5 days, under constant mixing of the bags platelets aggregation occurs in the cold and in absence of antigen

4.10 BLOOD ISSUE

BLOOD GROUPING:

There are 4 main groups – A,B, AB, and O . Your blood group is determined by the genes you inherits from the parents



Figure 1.24 BLOOD GROUPING

CROSS MATCHING:

Cross matching is performed prior to administration of blood or blood products e.g packed red blood cell . the purpose of the cross match is to detect the presence of the antibodies in the recipient against the red blood cell of donor . these antibodies attach to the red blood cell of the donor after transfusion

4.11 CROSS MATCHING

PRINCIPLE:

The cross match test is used to detect the presence of blood group antibodies in a recipient's serum/plasma to antigen on donor red blood cells. In this test, the donor red blood cells in a hypotonic buffered saline solution are combined with patient serum/plasma to allow antigen/antibody interaction in their upper chamber of the micro tube. This results in promoting antibody uptake. The detection of this antibody occurs when the sensitized red blood cells react with the Anti-IgG gel in the micro tube during centrifugation.

PROCEDURE:

Prepare donor and recipient blood sample for major cross match; donor red blood cells and recipient serum or plasma

For minor cross match; Recipient red cells and donor's serum or plasma

Prepare 3 – 5% cell suspensions of red cells.

Major Cross match; Label a test tube. Add two drops of the patient serum and one drop of the appropriate donor cell suspension.

Minor Cross match; Label a test tube. Add two drops of the appropriate donor serum and one drop of the patient cell suspension.

Mix the Tube and incubate at 37 °C for about 45 minutes. Add two drops of AHG (Antihuman globulin) and mix well.

Centrifuge for 1 minute at 1500 rpm



Figure 1.25 CROSS MATCHING KIT

INTERPRETATION AND RESULT:

Compatible donor and recipient blood should show no agglutination in both major and minor cross match. Blood which shows incompatibility in major cross should never be transfused, because the large plasma volume of the recipient blood containing antibodies can destroy the donor's red cells easily. The minor incompatibility is less important because the donor's serum which contains the antibodies is diluted in the recipient's own plasma, making the antibodies very dilute and ineffective.

4.12 BLOOD BANK RECORD

RECORD:

- Systematic procedure by which the records of an organization are created and captured , maintained and disposed off.
- Records involve every aspect of blood banking i.e donor recruitment donor selection , donor recall , blood collection, blood component , screening of blood for

TYPES OF RECORD:

- Technician record
- Donor record
- Reception record
- Sample storage record
- Test record
- Equipment maintenance record
- Transfusion record

TECHNICIAN RECORD:

- Attendance
- Contact no
- Address
- In time and out time
- Personal information
- Name
- DOB
- Age

DONOR RECORD:

- Donor details
- Name

- M/ F
- Age
- Weight/ height
- Blood grouping
- Blood donation date (volume)
- Use
- Donor identification

RECIPIENT RECORD:

- Name
- M/F
- Age
- In patient or out patient
- Recipient date
- Whole blood ,RBC ,Plasma, Platelets

PURPOSE OF RECORD:

- To create statistic
- To retain
- To maintain panel donor
- To recognize and to give award
- To help during emergency

FIGURES:

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CHENGALPATTU MEDICAL COLLEGE, CHENGALPATTU - 603001
(AFFILIATED TO THE TAMILNADU DR.M.G.R.MEDICAL UNIVERSITY,
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GOVT. CHENGALPATTU MEDICAL COLLEGE, CHENGALPATTU 603001
TAMILNADU
CERTIFICATE OF OBSERVERSHIP

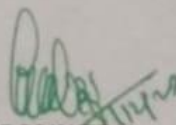
This is to certify that the following students studying in Sathyabama Institute of Science and Technology, Chennai has undergone observership for a period of One Month From 01.11.2023 & 30.11.2023 in the Department of Microbiology & Histopathology at Chengalpattu Medical College, Chengalpattu-603001.

Sl.No.	Name of the Student	Department	Period of posting
1	Mary G	Microbiology & Histopathology	01.11.2023 to 30.11.2023
2	Stephen Xavier M		
3	Oviya M.S		
4	Monika G		
5	Sowmiya S		
6	Shakeera Banu K		
7	Beruthose Banu S		
8	Ajith C		
9	Santhosh Kumar M.S		

They attend the training during the above period has been

Good




VICE PRINCIPAL

Chengalpattu Medical College,
Chengalpattu.

Date:21.12.2023

Place:Chengalpattu.

சென்னை
21/12/23



**Lions
BloodBank**
Tollfree
Helpline **1910**

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

Date: 12th Dec 2022

TO WHOMSOEVER IT MAY CONCERN

This is to certify that Ms. Oviya. M. S, 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, Egmore, Chennai - 08. 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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AMBATTUR : C-15, A.T.C. Road,
Ambattur Industrial Estate,
Chennai - 600 058. Tel : 48504959
Mob : 99419 17505
E-mail : info@lionsbloodbank.net

6. CONCLUSION

Had a great experience and learned lots of new things about blood banking and its maintenance donor selection, handling blood units components separation, storage detecting groups , cross matching ,compatibility test. and to record and register date of individual donor and recipient information by observing all the given things. I conclude that the company is of big scale industry , the **LIONS BLOOD BANK** has all the essential guidelines for maintaining quality and safe blood transfusions,