

INTERNSHIP REPORT

Submitted to

SATHYABAMA INSTITUTE OF SCIENCE AND TECHNOLOGY

In partial Fulfilment for the Award of the Degree Of

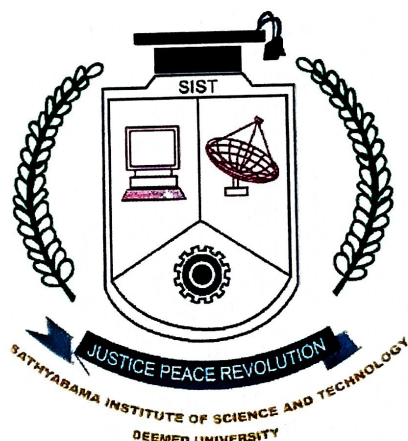
BACHELOR OF SCIENCE

In

MEDICAL LABORATORY TECHNOLOGY

By

Ms. MAHA LAKSHMI. S (Reg. No: 41737007)



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



SATHYABAMA
INSTITUTE OF SCIENCE AND TECHNOLOGY
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DEPARTMENT OF MEDICAL LABORATORY TECHNOLOGY

BONAFIDE CERTIFICATE

This is to certify that this internship report is the bonafide work of Ms. MAHA LAKSHMI.S have done the internship as a team and carried out the training program at "LIONS BLOOD BANK and RESEARCH FOUNDATION at EGMORE" and "VOLUNTARY HEALTH SERVICES HOSPITAL" under our supervision from November 2022 and November 2023.

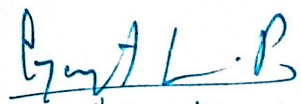

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DECLARATION

I, **MAHA LAKSHMI. S** hereby declare that the internship trainings done by me at “**LIONS BLOOD BANK AND RESEARCH FOUNDATION at EGMORE**” under the guidance of **Ms. D. JASMINE PRIYA** and “**VOLUNTARY HEALTH SERVICES HOSPITAL 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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INTERNSHIP REPORT

01/11/2023

WEEK: 01
WEDNESDAY

MEDIA PREPARATION



FIGURE 1

BLOOD AGAR PREPARATION

- Blood agar is a common microbiological medium used for the cultivation and isolation of a wide range of microorganisms, particularly fastidious bacteria such as Streptococcus and Staphylococcus species. Here's a brief overview of the preparation process for blood agar.

INGREDIENTS:

- ✧ Agar
- ✧ Nutrient Agar
- ✧ Human blood (5-10% concentration)
- ✧ Distilled water
- ✧ Non observed cotton
- ✧ Conical flask
- ✧ Silicon cover

- ✧ Autoclave
- ✧ Weight machine (analytical balance scale)
- ✧ Spatula
- ✧ Petri plats (90mm)

CALCULATION:

- Nutrient Agar=28g
- One litter water=1000ml
- Prepare volume= 250ml
- **Nutrient Agar=28/ 1000 × 250=7.0g**

PROCEDURE:

- Weigh and dissolve the appropriate amount of Nutrient Agar in distilled water according to manufacturer instructions. Typically, it's about 28 grams per litter.
- Heat the mixture to boiling to dissolve the agar completely.
- Autoclave the solution at 120°C for 15 minutes to sterilize it.
- Cool the solution to approximately 45-50°C but ensure it remains in a liquid state.
- Aseptically add the appropriate volume of sterile human blood (usually 5-10% concentration) to the agar solution while gently swirling to ensure uniform distribution.
- Pour the blood agar into sterile Petri dishes to a depth of about 4-5 mm (25ml).
- Allow the blood agar to solidify by leaving the Petri dishes on a level surface, or gently swirl the dishes to ensure even distribution of the blood.
- Once solidified, invert the plates and allow them to cool and set completely before storage or use.

NOTE:

- It's important to handle the blood agar preparation in a sterile environment to prevent contamination. Additionally, the specific concentrations and volumes of ingredients may vary based on the intended application and laboratory protocols. Proper labeling and storage of the prepared blood agar plates are also essential to maintain their integrity and efficacy for microbiological assays and analyses.

CHOCOLATE AGAR PREPARATION

- Chocolate agar, also known as heated blood agar, is a specialized growth medium primarily used for cultivating fastidious microorganisms, particularly *Haemophilus influenzae* and *Neisseria* species. Chocolate Agar procedure is similar to the blood agar. But there is a slight change in the way to chocolate agar process. Here's a brief overview of the preparation process for chocolate agar.

INGREDIENTS:

- ✧ Agar
- ✧ Nutrient Agar
- ✧ Human blood (5-10% concentration)
- ✧ Distilled water
- ✧ Non observed cotton
- ✧ Conical flask
- ✧ Silicon cover
- ✧ Autoclave
- ✧ Weight machine (analytical balance scale)
- ✧ Spatula
- ✧ Petri plats (90mm)

CALCULATION:

- Nutrient Agar=28g
- One litter water=1000ml
- Prepare volume= 250ml
- **Nutrient Agar=28/ 1000 × 250=7.0g**

PROCEDURE:

- Weigh and dissolve the appropriate amount of Nutrient Agar in distilled water according to manufacturer instructions. Typically, it's about 28 grams per litter.
- Heat the mixture to boiling to dissolve the agar completely.
- Autoclave the solution at 120°C for 15 minutes to sterilize it.

- Immediately add the appropriate volume of sterile human blood (usually 5-10% concentration) to the agar solution while gently swirling to ensure uniform distribution.
- Pour the chocolate agar into sterile Petri dishes to a depth of about 4-5 mm (25ml).
- Allow the chocolate agar to solidify by leaving the Petri dishes on a level surface, or gently swirl the dishes to ensure even distribution of the blood.
- Once solidified, invert the plates and allow them to cool and set completely before storage or use.

NOTE:

- Chocolate agar provides a nutrient-rich environment suitable for the growth of demanding microorganisms, making it an indispensable tool in microbiology laboratories for isolating and identifying bacterial pathogens.

MACCONKEY AGAR

- Macconkey Agar is a selective and differential medium commonly used in microbiology to isolate and differentiate gram-negative bacteria, particularly members of the Enterobacteriaceae family. Here's a brief overview of preparation process of macconkey agar.

INGREDIENTS:

- ✧ Macconkey Agar
- ✧ Distilled water
- ✧ Non observed cotton
- ✧ Conical flask
- ✧ Silicon cover
- ✧ Autoclave
- ✧ Weight machine (analytical balance scale)
- ✧ Spatula
- ✧ Petri plats (90mm)

CALCULATION:

- Macconkey Agar=51.53g

- One litter water=1000ml
- Prepare volume= 250ml
- **Macconkey Agar**= $51.53 / 1000 \times 250=12.88\text{g}$

PROCEDURE:

- Weigh and dissolve the appropriate amount of Macconkey Agar in distilled water according to manufacturer instructions. Typically, it's about 51.53 grams per litter.
- Heat the mixture to boiling to dissolve the agar completely.
- Autoclave the solution at 120°C for 15 minutes to sterilize it.
- Pour the macconkey agar into sterile Petri dishes to a depth of about 4-5mm (25ml).
- Allow the macconkey agar to solidify by leaving the Petri dishes on a level surface.
- Once solidified, invert the plates and allow them to cool and set completely before storage of use.

NOTE:

- Remember, the interpretation of results from Macconkey Agar should be considered alongside other biochemical and phenotypic tests for accurate identification of bacterial species. These meticulously helps ensure the quality and efficacy of Macconkey Agar for selective and differential bacterial growth in microbiological laboratories.

MULLEN HINT AGAR

- Mullen Hint Agar is a specialized medium used for the cultivation and isolation of fungi from various environmental and clinical samples. It contains specific nutrients and inhibitors to encourage fungal growth while suppressing bacterial contamination. Here's a brief overview of preparation process of mullen hint agar

INGREDIENTS:

- ✧ Mullen Hint Agar
- ✧ Distilled water
- ✧ Non-observed cotton
- ✧ Conical flask

- ✧ Silicon cover
- ✧ Autoclave
- ✧ Weight machine (analytical balance scale)
- ✧ Spatula
- ✧ Petri plats (90mm)

CALCULATION:

- Mullen Hint Agar=38g
- One litter water=1000ml
- Prepare volume= 250ml
- **Mullen Hint Agar=** $38 / 1000 \times 250=9.5\text{g}$

PROCEDURE:

- Weigh and dissolve the appropriate amount of Mullen Hint Agar in distilled water according to manufacturer instructions. Typically, it's about 38 grams per litter.
- Heat the mixture to boiling to dissolve the agar completely.
- Autoclave the solution at 120°C for 15 minutes to sterilize it.
- Pour the Mullen hint agar into sterile Petri dishes to a depth of about 4-5 mm (25ml).
- Allow the Mullen hint agar to solidify by leaving the Petri dishes on a level surface.
- Once solidified, invert the plates and allow them to cool and set completely before storage or use.

NOTE:

- These meticulously helps ensure the quality and efficacy of Mullen Hint Agar for the selective cultivation and isolation of fungi in microbiological laboratories.

BIOCHEMICAL PREPARATION



FIGURE 2

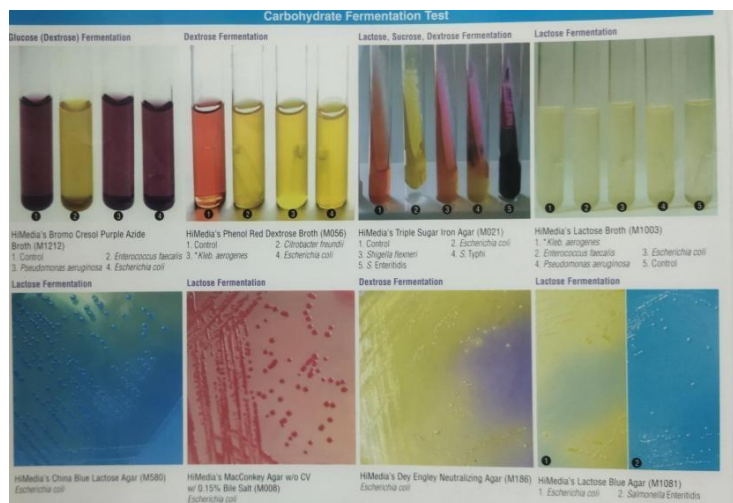


FIGURE 3

PEPTONE WATER PREPARATION:

- Peptone water is a common microbiological growth medium used for the cultivation and maintenance of bacteria. It typically consists of water and peptone, which is a partially digested protein source that provides essential nutrients for bacterial growth. Peptone water may also

contain other components like sodium chloride (salt) to maintain osmotic balance. Here's a general method for preparing peptone water

INGREDIENTS:

- ✧ Peptone
- ✧ Water
- ✧ Optional: Sodium chloride (NaCl) for salt concentration adjustment

PROCEDURE:

- Measure the appropriate volume of water needed for your desired batch size. You can use distilled water or deionized water for better purity.
- Add the calculated amount of peptone to the water. The concentration of peptone can vary depending on your specific application, but a common concentration is around 0.1% to 1% (w/v).
- If desired, add sodium chloride (NaCl) to the solution. The typical concentration of NaCl in peptone water ranges from 0.5% to 1.0% (w/v). This concentration helps maintain osmotic balance and can support the growth of certain bacterial species.
- Stir the mixture thoroughly to ensure that the peptone and any other components are completely dissolved in the water.
- Sterilize the peptone water solution to eliminate any existing microorganisms that could interfere with your experiments or culture growth. You can do this by autoclaving the solution at 121°C (250°F) for approximately 15-20 minutes.
- After sterilization, allow the peptone water to cool to room temperature before use. Ensure that the container used for storage is clean and sterile to prevent contamination.
- Once cooled, the peptone water is ready for use as a growth medium for cultivating bacteria. It can be used for various purposes such as bacterial isolation, enumeration, and maintenance in laboratory settings.

NOTE:

- Always follow standard microbiological techniques and safety protocols when preparing and handling peptone water and other laboratory media. Additionally, make sure to label the

container with the contents, concentration, and date of preparation for easy identification and tracking.

INDOL PREPARATION

INTRODUCTION:

- ✧ Indole is a heterocyclic organic compound with a bicyclic structure. It is commonly used in microbiology to detect indole production by bacteria. The indole test is often performed as part of biochemical tests to differentiate bacterial species, particularly within the Enterobacteriaceae family. Here's a simple method for preparing indole reagent.

INGREDIENTS:

- ✧ Kovac's reagent:
- ✧ p-Dimethylaminobenzaldehyde (DMAB)
- ✧ Amyl alcohol (also known as isoamyl alcohol or 3-methyl-1-butanol)
- ✧ Concentrated hydrochloric acid (HCl)

PROCEDURE:

- Measure 0.5 grams of p-Dimethylaminobenzaldehyde (DMAB).
- Add the measured DMAB to 100 mL of amyl alcohol (isoamyl alcohol).
- Mix the DMAB and amyl alcohol thoroughly until the DMAB is completely dissolved.
- Slowly add 5 mL of concentrated hydrochloric acid (HCl) to the DMAB-amyl alcohol solution while stirring continuously.
- Once all components are mixed, store the Kovac's reagent in a tightly sealed, dark-colored bottle to protect it from light and degradation. Kovac's reagent is used to detect indole production by bacteria. When the reagent is added to a bacterial culture that produces indole, a cherry-red color will develop at the interface of the reagent and the culture medium.

TO PERFORM THE INDOLE TEST USING KOVAC'S REAGENT:

- Inoculate a tube of tryptone broth or another suitable medium with the bacterial culture being tested for indole production.

- Incubate the culture at the appropriate temperature for the bacterial species being tested.
- After incubation, add several drops of Kovac's reagent to the surface of the broth culture.
- Observe the tube for the development of a cherry-red color at the interface between the culture medium and the reagent. The presence of this color indicates a positive indole test, suggesting that the bacteria produce indole from tryptophan.
- If no color change occurs, the test is negative for indole production.

NOTE:

- Always handle chemicals with care and follow appropriate safety precautions when preparing and using indole reagent and other laboratory reagents. Additionally, make sure to properly label all solutions and containers for easy identification and safe handling.

OF BASEL MEDIUM PREPARATION

INTRODUCTION:

- OF-GLUCOS, also known as Opsonizing Fixation-Glucose (GLUCOS) medium, is a specialized medium used in microbiology and immunology laboratories for studying opsonization, phagocytosis, and related immune responses. Here's a short note on the preparation of OF-GLUCOS medium

PURPOSE:

- OF-GLUCOS medium is designed to support the growth of bacteria and facilitate opsonization studies. It provides an environment rich in nutrients and components necessary for studying bacterial interactions with immune cells.

INGREDIENTS:

- ✧ Agar: Provides a solid base for microbial culture.
- ✧ Pep tone: A source of amino acids and nutrients for bacterial growth.
- ✧ Na Cl: Maintains osmotic balance.
- ✧ Glucose: A carbohydrate fuel for bacterial metabolism.
- ✧ Sodium bicarbonate:
Helps maintain pH balance.

- ✧ Rabbit serum: Contains complement proteins and antibodies essential opsonization.
- ✧ Sheep red blood cells (SRBCs): Used as target cells for opsonization assays.

PREPARATION:

- Dissolve the specified quantities of agar, pep tone, Na Cl, glucose, and sodium bicarbonate in distilled water to prepare the base medium.
- Autoclave the medium to sterilize it and ensure no microbial contamination.
- Cool the medium to around 50°C.
- Add rabbit serum to the cooled medium to introduce complement proteins and antibodies required for opsonization reactions.
- Optionally, add SRBCs to the medium as target cells for studying phagocytosis and optimization.
- Mix the components thoroughly to ensure even distribution.
- Pour the medium into suitable containers (Petri dishes, tubes, etc.) depending on the experimental setup and intended use.
- Allow the medium to solidify if using Petri dishes for agar-based cultures.
- Store the prepared OF-GLUCOSE medium under appropriate conditions (temperature, light exposure, etc.) to maintain its stability and effectiveness for experiments.

USAGE:

- OF-GLUCOSE medium is utilized in laboratory experiments to investigate optimization processes, phagocytes rates, and immune responses against bacterial pathogens.
- Researchers may expose the medium to bacteria, immune cells, antibodies, or complement proteins to study how these components interact and influence bacterial clearance by phagocytes.

STORAGE:

- Store the prepared OF-GLUCOSE medium at recommended temperatures and conditions to prevent deterioration and maintain its suitability for experimental use. Label containers clearly with preparation date, expiration date (if applicable), and any specific storage instructions.

SEROLOGY

INTRODUCTION:

- Serology is the branch of laboratory medicine that focuses on the detection, measurement, and study of antibodies and antigens in biological fluids, primarily serum and plasma. It plays a crucial role in diagnosing infectious diseases, autoimmune disorders, allergies, and assessing immune responses to vaccines.

HUMAN IMMUNODEFICIENCY VIRUS(HIV)

- HIV stands for Human Immunodeficiency Virus. It is a virus that attacks the body's immune system, specifically targeting CD4 cells (T cells), which are crucial for fighting off infections. HIV weakens the immune system over time, making the body more susceptible to various infections and diseases.
- If left untreated, HIV can progress to a more advanced stage called AIDS (Acquired Immunodeficiency Syndrome). AIDS is characterized by a severely weakened immune system, leading to life-threatening opportunistic infections and certain types of cancers.
- However, with early diagnosis and proper medical care, people living with HIV can manage the virus effectively and live long, healthy lives. Treatment typically involves antiretroviral therapy (ART), which helps control the virus and prevents its progression to AIDS. Additionally, prevention measures such as practicing safe sex and using clean needles for injections can significantly reduce the risk of HIV transmission.

TIR DOT TEST FOR HIV



FIGURE4

HIV 3rd GENERATION TEST:

- This type of test detects HIV antibodies in the blood. Antibodies are produced by the immune system in response to HIV infection. It typically takes about 2 to 8 weeks for the body to produce enough antibodies to be detected by this test, known as the "window period."
- 3rd generation tests are commonly used and are less expensive than 4th generation tests. However, they have a longer window period during which they may not detect HIV infection.

INGREDIENTS:

- ✧ Serum sample
- ✧ Tri dot card
- ✧ Wash buffer
- ✧ Protein conjugation
- ✧ Dropper

PROCEDURE:

- Take the tri dot HIV test card and kit, add the wash buffer 3 drops.
- Add 1 drop of patient's serum sample.
- Again add 5 drops of wash buffer.
- Add 2 drops of protein conjugation
- Again we will add 5 drops of wash buffer.
- And we will see the reaction and note it the reaction.

HIV 4th GENERATION TEST:

- This test detects both HIV antibodies and HIV antigens (proteins produced by the virus itself) in the blood. Because it can detect HIV antigens, it has a shorter window period compared to 3rd generation tests.
- The window period for 4th generation tests is typically around 2 to 4 weeks after exposure to the virus, making it more accurate in detecting early HIV infection.

INGREDIENTS:

- ✧ Serum sample

- ✧ Tri dot card
- ✧ Wash buffer
- ✧ Enzyme conjugation
- ✧ Sample diluent
- ✧ Substrate
- ✧ Dropper

PROCEDURE:

- Take the tri dot HIV test card and kit ,add the wash buffer 3 drops.
- And take 1smalle cuvet then add 3 drop of paints serum sample ,add 3 drops of sample diluent,and add 3drops of enzyme conjugation and mix it well.
- Again add 6 drops of wash buffer.
- Add 3 drops of substrate.
- And we will see the reaction and note it the reaction.

HEPATITIS B VIRUS(HBV)

INTRODUCTION:

- Hepatitis B Virus (HBV) is a highly contagious virus that primarily affects the liver. It can cause acute and chronic hepatitis, leading to serious liver complications such as cirrhosis and liver cancer. HBV is transmitted through contact with infected blood, semen, or other body fluids. Common modes of transmission include unprotected sexual intercourse, sharing needles or syringes, and from mother to child during childbirth.
- Many people with HBV do not experience symptoms, especially during the early stages of infection. When symptoms do occur, they can include fatigue, jaundice (yellowing of the skin and eyes), abdominal pain, loss of appetite, nausea, and dark urine.
- Prevention of HBV infection is crucial and can be achieved through vaccination, which is highly effective and safe. The HBV vaccine is recommended for all infants, children, and adults at risk of exposure. Other preventive measures include practicing safe sex, avoiding sharing needles or personal items with infected individuals, and following proper infection control protocols in healthcare settings.

- Treatment for HBV depends on whether the infection is acute or chronic. Acute infections may resolve on their own without specific treatment, while chronic infections may require antiviral medications to suppress viral replication and reduce liver damage. Regular monitoring and medical care are essential for managing chronic HBV infection and preventing complications.

INGREDIENTS:

- ✧ Serum sample
- ✧ Tri dot card
- ✧ Wash buffer
- ✧ Protein conjugation
- ✧ Dropper

PROCEDURE:

- Take the tri dot HBV test card and kit add the wash buffer 3 drops.
- Add 1 drop of patient's serum sample.
- Again add 5 drops of wash buffer.
- Add 2 drops of protein conjugation .
- Again we will add 5 drops of wash buffer.

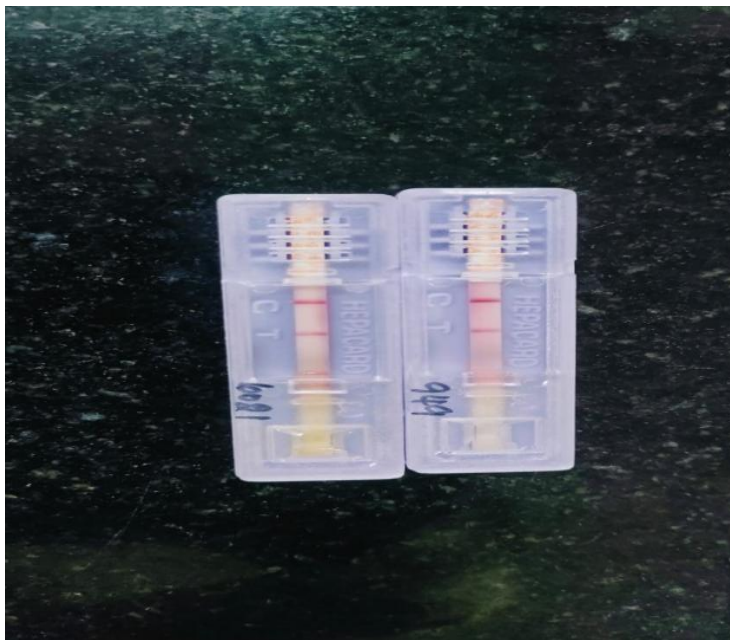


FIGURE5

HEPATITIS C VIRUS(HCV)

INTRODUCTION:

- HCV, short for Hepatitis C Virus, is a blood-borne virus that primarily targets the liver. It is transmitted through contact with infected blood, most commonly through sharing needles or equipment for injecting drugs, though it can also be transmitted through blood transfusions, needle stick injuries, and less commonly, sexual contact.
- Many people with HCV don't exhibit symptoms for years, leading to chronic infection, which can cause liver damage, cirrhosis, and an increased risk of liver cancer. Diagnosis involves blood tests to detect HCV antibodies and confirm active infection through HCV RNA testing.
- Fortunately, advancements in medicine have led to highly effective treatments known as direct-acting antivirals (DAAs), which can cure the infection in most cases. Prevention strategies include safe injection practices, using barrier methods during sexual activity, and avoiding sharing personal items that may have blood on them.
- Regular testing and early treatment are crucial for managing HCV and preventing complications.

INGREDIENTS:

- ✧ Serum sample
- ✧ Tri dot card
- ✧ Wash buffer
- ✧ Protein conjugation
- ✧ Dropper

PROCEDURE:

- Take the tri dot HCV test card and kit ,add the wash buffer 3 drops.
- Add 1 drop of paints serum sample.
- Again add 5 drops of wash buffer.
- Add 2 drops of protein conjugation .
- Again we add 5drops of wash buffer.



FIGURE6

RA FACTOR TEST

INTRODUCTION:

- Rheumatoid factor (RF) is an autoantibody that can be detected in the blood of people with certain autoimmune conditions, most notably rheumatoid arthritis (RA). However, it's important to note that the presence of RF is not exclusive to RA and can also occur in other autoimmune and non-autoimmune conditions.

C-REACTIVE PROTEIN (CRP)

INTRODUCTION:

- C-reactive protein (CRP) is a key biomarker of inflammation in the body. It is produced by the liver and its levels rise in response to inflammatory processes, making it useful in diagnosing and monitoring various conditions. Elevated CRP levels are associated with infections, injuries, autoimmune diseases, and cardiovascular risk. CRP testing via a blood sample is a common clinical practice to assess inflammation and guide treatment decisions.



FIGURE7

VDRL TEST

INTRODUCTION:

- VDRL stands for Venereal Disease Research Laboratory test. It is a blood test used to screen for syphilis, a sexually transmitted infection (STI) caused by the bacterium *Treponema pallidum*. The VDRL test detects the presence of antibodies that the body produces in response to the syphilis infection.
- The test works by mixing a sample of the patient's blood with a substance that contains particles of the syphilis bacterium. If antibodies to syphilis are present in the blood, they will react with these particles, causing them to clump together. This reaction is then observed under a microscope or through other detection methods to determine if the antibodies are present.
- It's important to note that while the VDRL test is a commonly used screening tool for syphilis, it is not definitive on its own. Additional tests, such as the *Treponema pallidum* particle agglutination (TP-PA) test or fluorescent treponemal antibody absorption (FTA-ABS) test, may be needed to confirm a syphilis diagnosis.

WIDAL TEST

INTRODUCTION:

- The Widal test is a serological test used to diagnose certain types of bacterial infections, specifically typhoid fever and paratyphoid fever, which are caused by the bacteria *Salmonella*

typhi and Salmonella paratyphi, respectively. The test is named after Georges-Fernand Widal, a French physician who developed it in the late 19th century.

- The Widal test detects antibodies in the blood that are produced by the immune system in response to these bacterial infections. It is commonly used in regions where typhoid fever is prevalent, especially in developing countries.

ELECTROLYTES PANEL

INTRODUCTION:

- An electrolyte panel is a blood test that measures the levels of electrolytes in the body. Electrolytes are minerals with an electric charge that help regulate various bodily functions, including nerve function, muscle contraction, pH balance, and fluid balance. The main electrolytes measured in an electrolyte panel typically include.
- There are using 1980 electrolytes analyzer.
- It's detects:
 - ✧ Sodium
 - ✧ Pottasium
 - ✧ calcium



FIGURE8

SODIUM(Na)

- Sodium plays a crucial role in maintaining fluid balance, nerve function, and muscle contraction. Abnormal sodium levels can indicate dehydration, kidney disease, or other health issues.

POTASSIUM(K⁺)

- Potassium is essential for proper muscle function, nerve function, and heart rhythm. Abnormal potassium levels can be caused by kidney disease, dehydration, certain medications, or metabolic disorders.

CALCIUM(Ca⁺)

- While calcium is not always included in a basic electrolyte panel, it is an important electrolyte involved in bone health, muscle function, nerve transmission, and blood clotting. Abnormal calcium levels can be related to various conditions, including kidney disease, thyroid disorders, and vitamin D imbalances.

NOTE:

- An electrolyte panel is often ordered as part of a routine health checkup, to evaluate symptoms such as dehydration, electrolyte imbalances, kidney function, acid-base balance, and monitor certain medical conditions or treatments that can affect electrolyte levels. Interpretation of the results requires consideration of the individual's overall health status, medical history, and other laboratory tests.

09/11/2023

**WEEK: 02
WEDNESDAY**

HEMATOLOGY & CLINICAL PATHOLOGY

INTRODUCTION:

- Hematology is the branch of medicine that focuses on the study of blood and blood disorders. It encompasses the examination of blood cells, their production, function, and related diseases. Hematologists are specialized medical professionals who diagnose and treat conditions such as anemia, leukemia, lymphoma, and various bleeding disorders.

- Hematology plays a crucial role in modern healthcare by helping to diagnose and manage a wide range of conditions that affect blood and its components. Advances in technology, such as automated cell counters and genetic testing, continue to enhance the field's capabilities for accurate diagnosis and targeted treatment strategies.
- The VHS laboratory is used fully automatic analyzer for the CBC and HbA1C.
- The Sysmex analyzer is used.

HEMATOLOGY ANALYZER



FIGURE9

COMPLETE BLOOD COUNT(CBC)

- CBC stands for Complete Blood Count, which is one of the most common blood tests ordered by healthcare providers. It provides valuable information about the cellular components of the blood and helps in diagnosing various medical conditions.

PARAMETERS OF CBC

- ✧ RBC

- ✧ Hb
- ✧ MCV
- ✧ PCV
- ✧ MCHC
- ✧ platelet
- ✧ WBC
- ✧ Neutrophils
- ✧ Lymphocytes
- ✧ Monocytes
- ✧ Eosinophils
- ✧ Basophils.

RED BLOOD CELLS (RBCs):

- CBC measures parameters related to red blood cells, such as hemoglobin (Hb), hematocrit (Hct), red blood cell count (RBC), mean corpuscular volume (MCV), mean corpuscular hemoglobin (MCH), and mean corpuscular hemoglobin concentration (MCHC). These parameters assess the oxygen-carrying capacity and size of red blood cells.

WHITE BLOOD CELLS (WBCs):

- CBC includes the total white blood cell count (WBC) and differential counts of different types of white blood cells, such as neutrophils, lymphocytes, monocytes, eosinophils, and basophils. This information helps in assessing the body's immune response and detecting infections or inflammatory conditions.

PLATELETS:

- CBC measures the platelet count, which is important for blood clotting and helps in evaluating bleeding disorders or clotting abnormalities.

SIGNIFICANCE OF CBC:

- ✧ Detecting Anemia:
- CBC helps in diagnosing various types of anemia by assessing red blood cell parameters like hemoglobin, hematocrit, and red cell indices.

- Infection and Inflammation:
- Elevated white blood cell counts (leukocytosis) can indicate infections, while specific changes in the differential count can provide clues about the type of infection or inflammatory response.
- Monitoring Blood Disorders:
- CBC is used to monitor the progression of blood disorders such as leukemia, lymphoma, and myelodysplastic syndromes by tracking changes in blood cell counts and morphology.
- Assessing Bleeding Disorders:
- Platelet counts and other parameters in CBC help in evaluating bleeding disorders like thrombocytopenia or thrombocytosis.
- ✧ General Health Screening:
- CBC is often included as part of routine health check-ups to assess overall health status and detect potential underlying medical conditions.

NOTE:

- CBC is a comprehensive blood test that provides essential information about red blood cells, white blood cells, and platelets, aiding in the diagnosis, monitoring, and management of various health conditions.

PERIPHERAL SMEAR STUDY

INTRODUCTION:

- A peripheral blood smear, often referred to simply as a blood smear, is a diagnostic test used in hematology to examine the cellular components of blood under a microscope. Here's a short note on what a peripheral blood smear involves and its significance in medical diagnosis.

PROCEDURE

BLOOD COLLECTION:

- A small sample of blood is typically obtained from a vein in the arm using a needle and syringe or through a finger prick.

PREPARATION OF BLOOD SMEAR:

- A drop of blood is placed on a glass slide and spread thinly across the surface using another slide, creating a thin, even layer of blood cells.

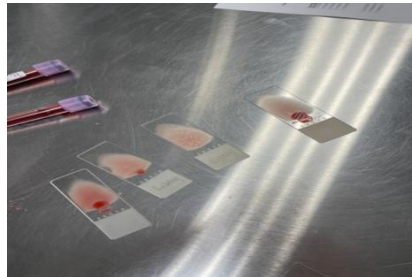


FIGURE10

STAINING:

- The blood smear is then stained with special dyes, such as Wright's stain or Giemsa stain, which help to highlight the different types of blood cells and their characteristics.

MICROSCOPIC EXAMINATION:

- The stained blood smear is examined under a microscope by a trained medical professional, such as a hematologist or medical laboratory technician.

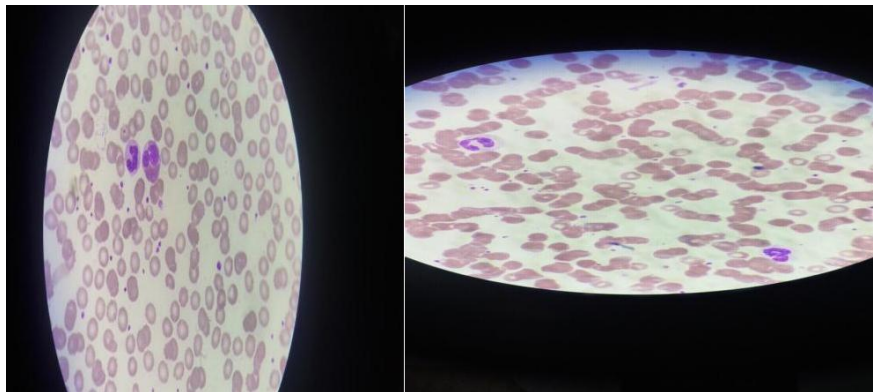


FIGURE11

FIGURE12

SIGNIFICANCE

CELLULAR MORPHOLOGY:

- A peripheral blood smear allows for the visual inspection of various blood cell types, including red blood cells (RBCs), white blood cells (WBCs), and platelets. This examination helps in assessing the size, shape, color, and distribution of these cells.

DIAGNOSIS OF BLOOD DISORDERS:

- By examining the morphology of blood cells, peripheral blood smears can aid in diagnosing a wide range of blood disorders, such as anemia (e.g., iron deficiency anemia, sickle cell anemia), infections (e.g., malaria), leukemia, and clotting disorders.

IDENTIFICATION OF ABNORMALITIES:

- Peripheral blood smears can reveal abnormalities such as the presence of immature or abnormal cells (e.g., blast cells in leukemia), changes in cell size (e.g., macrocytosis, microcytosis), abnormal cell shapes (e.g., sickle cells), and the presence of parasites or microorganisms in the blood.

MONITORING TREATMENT RESPONSE:

- Blood smears may be used to monitor the response to treatment in patients with blood disorders, leukemia, or infections. Changes in blood cell morphology over time can indicate the effectiveness of treatment or disease progression.

NOTE:

- A peripheral blood smear is a valuable diagnostic tool in hematology that provides detailed information about the morphology of blood cells, aiding in the diagnosis and management of various blood-related disorders and conditions.

HbA1C TEST

- The HbA1c test, also known as the glycated hemoglobin test, is a blood test used to measure the average blood sugar levels over the past 2 to 3 months. It's a crucial tool in managing diabetes because it provides a long-term view of blood glucose control.

FORMATION OF HBA1C:

- When glucose (sugar) is in the bloodstream, it attaches to hemoglobin, a protein in red blood cells that carries oxygen. This attachment process is called glycation. Over time, the glucose molecules become permanently bonded to the hemoglobin, forming HbA1c.

MEASUREMENT:

- The hba1c test measures the percentage of hemoglobin that is glycated. For example, an hba1c level of 7% means that 7% of the hemoglobin in the blood has glucose attached to it.

SIGNIFICANCE:

- Unlike daily glucose tests that show current levels, the HbA1c test reflects average blood sugar levels over several weeks. This is important because it gives healthcare providers and individuals with diabetes a broader perspective on blood sugar control.

DIABETES MANAGEMENT:

- For people with diabetes, maintaining a target HbA1c level is crucial for reducing the risk of long-term complications such as heart disease, kidney damage, and nerve problems. Target HbA1c levels vary based on factors like age, overall health, and diabetes type, and are typically set by healthcare providers.

MONITORING:

- Regular monitoring of HbA1c levels is part of effective diabetes management. It helps healthcare providers assess treatment effectiveness, adjust medications if necessary, and make lifestyle recommendations to improve blood sugar control.

NOTE:

- The HbA1c test plays a vital role in diabetes care by providing valuable information about long-term blood sugar management and helping individuals with diabetes make informed decisions about their health.

URINE ROUTIN

- A urine routine test, also known as a urinalysis, is a common medical test that examines a urine sample to evaluate various aspects of a person's health.
- VHS laboratory is used urine routine strip method.
- The strips is analysis the Siemens urine analyzer.

SIEMENS URINE ROUTIN ANALYZER



FIGURE13

SIEMENS URINE ROUTINE STRIP



FIGURE14

PHYSICAL EXAMINATION

COLOR:

- Normal urine color ranges from pale yellow to amber. Different colors may indicate certain health conditions. For example, red or pink urine may suggest the presence of blood, while greenish urine may be due to certain medications or foods.

CLARITY:

- Normal urine is typically clear. Cloudy or turbid urine may indicate the presence of particles such as white blood cells, red blood cells, or bacteria.

ODOR:

- Normal urine has a mild odor. Strong or unusual odors can be due to various factors such as diet, medications, or infections.

CHEMICAL ANALYSIS

PH LEVEL:

- The acidity or alkalinity of urine can provide insights into kidney function and acid-base balance.

SPECIFIC GRAVITY:

- This measures the concentration of solutes in urine and can indicate hydration status and kidney function.

PROTEIN:

- Elevated protein levels in urine may suggest kidney damage or disease.

GLUCOSE:

- Presence of glucose in urine can be a sign of diabetes or other metabolic disorders.

KETONES:

- Ketones in urine may indicate conditions such as diabetic ketoacidosis or starvation.

BILIRUBIN AND UROBILINOGEN:

- Abnormal levels of these substances may point to liver or gallbladder issues.

NITRITES AND LEUKOCYTE ESTERASE:

- Presence of these can indicate urinary tract infections (UTIs).

MICROSCOPIC EXAMINATION

RED BLOOD CELLS (RBCs):

- Presence of RBCs may suggest bleeding in the urinary tract.

WHITE BLOOD CELLS (WBCs):

- Elevated WBC count can indicate inflammation or infection in the urinary tract.

BACTERIA AND YEAST:

- Presence of these microorganisms can indicate infection.

CRYSTALS:

- Certain crystals in urine may suggest kidney stones or metabolic disorders.

NOTE:

- Interpreting the results of a urine routine test requires medical expertise, as various factors can influence the findings. It's essential to consult with a healthcare provider for proper evaluation and diagnosis based on your individual test results and medical history.

STOOL ROUTINE TEST

- A stool routine test, also known as a stool analysis or stool culture, is a medical test that examines a stool sample for various indicators of gastrointestinal health and potential infections. Here's an overview of what a stool routine test typically involves.

COLLECTION OF STOOL SAMPLE:

- The first step is to collect a small sample of your stool. This is usually done at home using a clean container provided by your healthcare provider. It's important to avoid mixing urine or water with the sample.

TRANSPORTATION:

- The sample needs to be transported to the laboratory promptly, preferably within a few hours, to ensure accurate results. Some tests may require specific transportation conditions, such as keeping the sample refrigerated.

PROCESSING AT THE LABORATORY:

- Once the sample reaches the laboratory, technicians will process it to perform various tests. These tests may include

MICROSCOPIC EXAMINATION:

- This involves examining the stool sample under a microscope to look for the presence of parasites, bacteria, or abnormal cells.

CULTURE:

- In a stool culture, the sample is cultured in a special medium to identify any bacterial or fungal infections.

OVA AND PARASITE EXAMINATION:

- This test specifically looks for the presence of parasitic eggs or larvae in the stool.

BIOCHEMICAL TESTS:

- These tests can detect the presence of blood, excess fat, or other substances in the stool that may indicate digestive problems.

ANALYSIS OF RESULTS:

- Once the tests are completed, the laboratory will analyze the results. The healthcare provider will then review these results in the context of your symptoms and medical history to make a diagnosis or recommend further testing or treatment if necessary.

NOTE:

- Stool routine tests are commonly used to diagnose gastrointestinal infections, inflammatory bowel diseases (such as Crohn's disease or ulcerative colitis), malabsorption disorders, and other digestive issues. It's essential to follow your healthcare provider's instructions for collecting and handling the stool sample to ensure accurate test results.

STOOL OCCULT BLOOD

INTRODUCTION:

- Stool occult blood refers to blood in the stool that is not visible to the naked eye. This blood is usually detected through a stool occult blood test, also known as a fecal occult blood test (FOBT). Here's an overview of what stool occult blood is and how the test is performed.

- Stool occult blood refers to small amounts of blood that are not visible in the stool but can be detected through laboratory testing. This blood may come from various sources in the digestive tract, such as the stomach, intestines, or rectum. It is often a sign of underlying medical conditions, such as gastrointestinal bleeding, ulcers, polyps, hemorrhoids, or colorectal cancer.

HEMOSPOT CARD FRONT SIDE



FIGURE15

HEMOSPOT CARD BACK SIDE

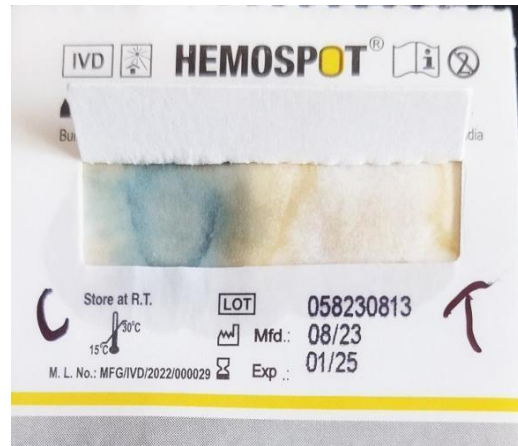


FIGURE16

HEMOSPOT CARD TEST

INGREDIENTS:

- Hemospot card
- Positive control
- Buffer
- Stool sample
- Stick

PROCEDURE:

- Take a hemospot card and mark them control and test.
- Add one drop of positive control in control.
- Add small amount of stool sample in test.
- The card is closed and back side of card.
- Add one drop of buffer for both sides.

STOOL OCCULT BLOOD TEST (FOBT):

- A stool occult blood test is a simple and non-invasive test used to detect the presence of occult (hidden) blood in the stool. There are two main types of FOBT

GUAIAIC-BASED FOBT (GFOBT):

- This traditional method uses a chemical called guaiac to detect the presence of heme, a component of hemoglobin found in blood. A small stool sample is collected by the patient and applied to a test card containing guaiac. If there is blood in the sample, a color change occurs on the test card.

FECAL IMMUNOCHEMICAL TEST (FIT):

- FIT is a newer and more specific test that detects human hemoglobin using antibodies. It does not require dietary restrictions (such as avoiding red meat or certain medications) like gFOBT does. FIT is becoming increasingly popular due to its higher sensitivity for detecting lower levels of blood in the stool.

PURPOSE OF THE TEST:

- The stool occult blood test is primarily used as a screening tool for colorectal cancer and other gastrointestinal conditions that can cause bleeding. It is often recommended for individuals over a certain age (typically 50 and older) as part of routine colorectal cancer screening. Additionally, it may be used to investigate unexplained anemia, gastrointestinal symptoms (such as abdominal pain or changes in bowel habits), or monitor patients with known gastrointestinal conditions.

INTERPRETING RESULTS:

- A positive result on a stool occult blood test indicates the presence of blood in the stool. However, it does not diagnose the underlying cause of the bleeding. Further evaluation, such as colonoscopy, may be needed to determine the source of the bleeding and guide appropriate treatment.

NOTE:

- It's important to note that certain factors, such as dietary intake (e.g., red meat, certain medications) or menstrual bleeding in women, can potentially affect the results of a stool occult blood test. Therefore, it's essential to follow any instructions provided by your healthcare provider regarding diet and medication before undergoing the test.

16/11/2023

WEEK: 03
WEDNESDAY

BIOCHEMISTRY

INTRODUCTION:

- Biochemistry is the branch of science that deals with the study of the chemical processes and substances that occur within living organisms. It's a multidisciplinary field that combines principles from biology, chemistry, physics, and mathematics to understand the molecular mechanisms underlying various biological phenomena.
- biochemistry plays a crucial role in unraveling the complexities of life at the molecular level, contributing significantly to advancements in scientific knowledge and technological innovation.
- A fully automatic analyzer is used in the laboratory.

RENAL FUNCTION TEST

- Renal function tests are a group of blood and urine tests used to assess the functioning of the kidneys. These tests provide valuable information about how well the kidneys are filtering waste products from the blood, maintaining electrolyte balance, and producing urine. Here are some common renal function tests.

BLOOD UREA NITROGEN (BUN):

- BUN measures the amount of nitrogen in the blood that comes from urea, a waste product produced when the liver breaks down proteins. Elevated BUN levels can indicate kidney dysfunction, dehydration, or high protein intake.

SERUM CREATININE:

- Creatinine is a waste product produced by muscle metabolism. The level of creatinine in the blood reflects kidney function because the kidneys filter creatinine from the blood. Elevated creatinine levels may indicate reduced kidney function.

GLOMERULAR FILTRATION RATE (GFR):

- GFR is a calculated value that estimates how much blood passes through the glomeruli (the tiny filters in the kidneys) per minute. It is considered the best indicator of kidney function. A lower GFR value indicates decreased kidney function.

CREATININE CLEARANCE:

- Creatinine clearance is a measure of how efficiently the kidneys are removing creatinine from the blood. It is calculated based on a 24-hour urine collection and a blood sample. This test helps assess kidney function more accurately than serum creatinine alone.

URINE TESTS:

- Various urine tests can provide information about kidney function and health:

URINALYSIS:

- This test evaluates the physical, chemical, and microscopic properties of urine, including the presence of protein, blood, glucose, and other substances.

URINARY ALBUMIN:

- Measures the amount of albumin (a type of protein) in urine. Elevated levels may indicate kidney damage, especially in conditions like diabetes.

URINE ELECTROLYTES:

- Measures the levels of electrolytes (sodium, potassium, chloride) in urine, which can indicate how well the kidneys are regulating electrolyte balance.

OTHER TESTS:

- Depending on the clinical situation, additional tests such as serum electrolytes (sodium, potassium, chloride, bicarbonate), blood pH, and imaging studies (e.g., ultrasound, CT scan) may be done to evaluate kidney function and detect any abnormalities.

NOTE:

- Interpretation of renal function tests requires considering multiple factors, including age, gender, muscle mass, medications, and overall health status. Abnormal results may indicate acute or chronic kidney disease, dehydration, electrolyte imbalances, urinary tract obstruction, or other medical conditions. Treatment and management will depend on the specific underlying cause identified through these tests.

LIVER FUNCTION TESTS

- Liver function tests (LFTs) are a group of blood tests used to assess the health and function of the liver. These tests are often ordered by doctors to evaluate liver function, diagnose liver diseases, monitor the progression of liver conditions, or assess the effectiveness of treatments. Here are some common tests included in liver function tests.

ALANINE TRANSAMINASE (ALT) AND ASPARTATE TRANSAMINASE (AST):

- These enzymes are found in liver cells. Elevated levels may indicate liver damage or injury, such as hepatitis or cirrhosis.

ALKALINE PHOSPHATASE (ALP):

- This enzyme is found in the liver and bones. Increased ALP levels may indicate liver or bone disease.

GAMMA-GLUTAMYL TRANSFERASE (GGT):

- Elevated GGT levels may indicate liver or bile duct damage. It is often used to detect alcohol abuse.

BILIRUBIN:

- Bilirubin is a waste product produced when red blood cells break down. High levels of bilirubin may indicate liver disease or other conditions affecting the liver's ability to process bilirubin.

ALBUMIN AND TOTAL PROTEIN:

- These tests measure the levels of proteins in the blood, including albumin produced by the liver. Abnormal levels may indicate liver disease or malnutrition.

PROTHROMBIN TIME (PT) AND INTERNATIONAL NORMALIZED RATIO (INR):

- These tests assess blood clotting factors produced by the liver. Abnormal results may indicate liver damage or a disorder affecting blood clotting.

NOTE:

- Interpretation of liver function tests requires consideration of multiple factors, including the specific tests performed, the patient's medical history, symptoms, and other diagnostic tests. Abnormal results may indicate various liver conditions, such as hepatitis, fatty liver disease, cirrhosis, or liver cancer. Further evaluation by a healthcare provider is necessary for an accurate diagnosis and appropriate management.

LIPID PROFILE

- The Lipid Profile Test, also known as a lipid panel, is a blood test that measures various types of cholesterol and fats in your blood. It's used to assess your risk of heart disease and to monitor your lipid levels if you have a known risk factor or condition such as high blood pressure, diabetes, or a family history of heart disease.
- A standard lipid profile typically includes the following measurements.

TOTAL CHOLESTEROL:

- This is the sum of all types of cholesterol in your blood, including low-density lipoprotein (LDL) cholesterol, high-density lipoprotein (HDL) cholesterol, and very-low-density lipoprotein (VLDL) cholesterol.

LDL CHOLESTEROL:

- Often referred to as "bad" cholesterol, LDL carries cholesterol from the liver to the cells. High levels of LDL can lead to the buildup of plaque in the arteries, increasing the risk of heart disease and stroke.

HDL CHOLESTEROL:

- Known as "good" cholesterol, HDL helps remove LDL cholesterol from the bloodstream, which can reduce the risk of heart disease.

TRIGLYCERIDES:

- These are a type of fat found in the blood. High levels of triglycerides can also increase the risk of heart disease.

NOTE:

- The lipid profile test results are typically interpreted in conjunction with other risk factors such as age, gender, blood pressure, smoking status, and family history of heart disease. Depending on your overall risk profile, your healthcare provider may recommend lifestyle changes, medication, or further testing.
- It's important to note that before taking a lipid profile test or any other medical test, you should consult with your healthcare provider to determine if it's appropriate for you and to understand the implications of the results.

GLUCOSE TOLAREN'S TEST(GTT)

- The Glucose Tolerance Test (GTT) is a medical test used to diagnose diabetes and assess how the body processes glucose (sugar) over time. Here's an overview of how the test is typically conducted.

PREPARATION:

- Before the test, the individual is instructed to fast overnight (usually for 8-12 hours) to ensure accurate results. During this fasting period, only water is allowed, and the person should avoid eating or drinking anything else.

BASELINE BLOOD SAMPLE:

- On the morning of the test, a baseline blood sample is taken to measure the individual's fasting blood glucose level.

GLUCOSE CONSUMPTION:

- After the baseline blood sample is taken, the person is given a glucose solution to drink. This solution contains a specific amount of glucose, typically around 75 grams, although variations may occur depending on the healthcare provider's protocol.

BLOOD SAMPLES AT INTERVALS:

- Blood samples are then taken at specified intervals after the glucose solution is consumed. The intervals commonly used are at 30 minutes, 1 hour, 2 hours, and sometimes even 3 hours after consuming the glucose solution.

BLOOD GLUCOSE MEASUREMENTS:

- Each blood sample collected is tested to measure the blood glucose level at that particular time point.

INTERPRETATION:

- The results of the GTT are interpreted based on the blood glucose levels measured at each interval. A healthcare provider will analyze these results to determine how effectively the body is processing glucose. Typically, elevated blood glucose levels beyond certain thresholds at specific time points indicate impaired glucose tolerance or diabetes.

NOTE:

- The Glucose Tolerance Test is an important tool in diagnosing conditions such as gestational diabetes (diabetes during pregnancy) and identifying individuals with impaired glucose tolerance who may be at risk of developing diabetes in the future. It is usually performed under medical supervision due to the need for precise timing and blood glucose measurements.

GLUCOSE TEST

Glucose test have three type there are included:

- ✧ Fasting blood sugar
- ✧ Post blood sugar
- ✧ Random blood sugar

FASTING BLOOD SUGAR

- "Fasting Blood Sugar" (FBS) refers to the level of glucose (sugar) in your blood after you have fasted for a certain period, typically 8-12 hours. This test is commonly used to diagnose and monitor diabetes and prediabetes.

FASTING:

- It means you haven't eaten or consumed any beverages other than water for at least 8 hours (overnight fasting).

BLOOD:

- The test involves drawing a sample of blood, usually from a vein in your arm.

SUGAR:

- The blood sample is then tested to measure the concentration of glucose (sugar) in your bloodstream.
- Normal fasting blood sugar levels typically range from 70 to 99 milligrams per deciliter (mg/dL), but these values may vary slightly depending on the lab and the individual's specific health conditions.
- Fasting blood sugar levels outside the normal range can indicate various health conditions.

HIGH FASTING BLOOD SUGAR (HYPERGLYCEMIA):

- This can be a sign of diabetes or prediabetes. Consistently elevated fasting blood sugar levels may require further testing and medical evaluation.

LOW FASTING BLOOD SUGAR (HYPOGLYCEMIA):

- This can occur in people with diabetes who are taking medications that lower blood sugar levels, such as insulin or certain oral medications. It can also happen in non-diabetic individuals due to various reasons, such as prolonged fasting or certain medical conditions.

NOTE:

- Monitoring fasting blood sugar levels is an essential part of managing diabetes and assessing overall metabolic health. People with diabetes often track their fasting blood sugar levels regularly, along with other measures like HbA1c (average blood sugar levels over the past 2-3 months), to manage their condition effectively.

POSTPRANDIAL BLOOD SUGAR

- "Postprandial Blood Sugar" refers to the level of glucose (sugar) in your blood after you have eaten a meal. This test is used to monitor how your body processes sugar after consuming food and can be helpful in diagnosing and managing diabetes.

POSTPRANDIAL:

- This term refers to the period after eating a meal.

BLOOD:

- Like the fasting blood sugar test, a sample of blood is drawn from a vein in your arm.

SUGAR:

- The blood sample is then tested to measure the concentration of glucose in your bloodstream after you've eaten.
- The normal range for postprandial blood sugar levels can vary depending on factors such as the time since eating, the type and amount of food consumed, and individual health conditions. Generally, postprandial blood sugar levels are considered normal if they stay below 140 mg/dL two hours after eating.

**ELEVATED POSTPRANDIAL BLOOD SUGAR LEVELS CAN INDICATE:
IMPAIRED GLUCOSE TOLERANCE (PREDIABETES):**

- This is a condition where blood sugar levels are higher than normal but not high enough to be classified as diabetes. It's a warning sign that indicates an increased risk of developing type 2 diabetes.

DIABETES:

- Consistently high postprandial blood sugar levels, along with other tests like fasting blood sugar and HbA1c, can indicate diabetes.

NOTE:

- Monitoring postprandial blood sugar levels is essential for people with diabetes or prediabetes to understand how their body responds to different foods and to help manage blood sugar levels effectively. It's often part of a comprehensive diabetes management plan that includes lifestyle changes, medication (if needed), and regular monitoring of blood glucose levels.

RANDOM BLOOD SUGAR:

- "Random Blood Sugar" refers to the level of glucose (sugar) in your blood at any given time, regardless of when you last ate. Unlike fasting blood sugar or postprandial blood sugar, which are measured under specific conditions (fasting or after eating a meal), random blood sugar can be tested at any time during the day.

RANDOM:

- This term indicates that the blood sugar level is measured without regard to the time since eating. It can be done at any time during the day, whether you've eaten recently or not.

BLOOD:

- A sample of blood is drawn from a vein in your arm or through a finger prick.

SUGAR:

- The blood sample is then tested to measure the concentration of glucose in your bloodstream.

- The normal range for random blood sugar levels can vary depending on factors such as age, health condition, and other individual factors. In general, random blood sugar levels should typically be below 200 mg/dL. However, what's considered normal can vary based on specific circumstances and the criteria used by healthcare providers.

ELEVATED RANDOM BLOOD SUGAR LEVELS CAN INDICATE VARIOUS CONDITIONS, INCLUDING:

DIABETES:

- Consistently high random blood sugar levels, especially above 200 mg/dL, can be a sign of diabetes.

STRESS OR ILLNESS:

- Random blood sugar levels can also be influenced by factors such as stress, illness, certain medications, or other health conditions.

PREDIABETES:

- Random blood sugar levels that are higher than normal but not high enough to be classified as diabetes may indicate prediabetes.

NOTE:

- Random blood sugar tests are often used as a screening tool for diabetes, especially if a person is showing symptoms like increased thirst, frequent urination, fatigue, or unexplained weight loss. However, for a definitive diagnosis of diabetes, additional tests such as fasting blood sugar, oral glucose tolerance test (OGTT), or HbA1c may be required.

23/11/2023

WEEK: 04
WEDNESDAY

MICROBIOLOGY

INTRODUCTION:

- Microbiology is the scientific study of microorganisms, which are microscopic organisms such as bacteria, viruses, fungi, and protists. These organisms are typically too small to be seen with the naked eye and require a microscope for observation. Microbiology encompasses various disciplines, including bacteriology (study of bacteria), virology (study of viruses), mycology (study of fungi), and parasitology (study of parasites).
- Microorganisms play crucial roles in various aspects of life, from sustaining ecosystems to causing infectious diseases. Microbiologists study these organisms to understand their structure, function, genetics, ecology, and interactions with other organisms. Their research contributes to fields like medicine, agriculture, biotechnology, environmental science, and food industry.
- Key areas of microbiology include microbial physiology (how microorganisms function), microbial genetics (their genetic makeup and inheritance), immunology (how the immune system responds to microbes), and epidemiology (study of the spread and control of diseases). Advances in microbiology have led to significant breakthroughs in healthcare, such as the development of antibiotics, vaccines, and diagnostic techniques, contributing to improvements in public health worldwide.
- The VHS laboratory is used VITEK 2 COMPACT analysis for microbiology.
 - ✧ Blood culture
 - ✧ Urine culture
 - ✧ Stool culture
 - ✧ Sputum culture
 - ✧ Tissue culture
 - ✧ Wound swab
 - ✧ Covid swab

VITEK 2 COMPACT



FIGURE17

VITEK 2 COMPACT CARDS

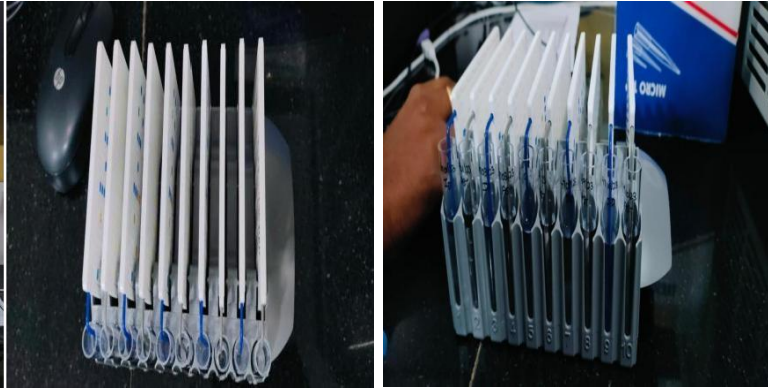


FIGURE18

BLOOD CULTURE

- A blood culture is a medical test used to detect the presence of bacteria, fungi, or other microorganisms in a person's blood. It is typically done when a healthcare provider suspects that a patient may have a bloodstream infection, also known as bacteremia or sepsis.

SAMPLE COLLECTION:

- A healthcare professional will clean the skin surface with an antiseptic solution to reduce the risk of contamination. They will then insert a needle into a vein (usually in the arm) to draw blood into sterile bottles or containers specifically designed for blood cultures.

INCUBATION:

- The collected blood samples are then sent to a laboratory for analysis. In the lab, the samples are placed in a special culture medium that promotes the growth of microorganisms. The culture bottles are then incubated at body temperature (37°C or 98.6°F) for a certain period, typically 24 to 48 hours.

OBSERVATION:

- During the incubation period, laboratory technicians regularly check the culture bottles for signs of microbial growth. They look for changes such as cloudiness, turbidity, or the formation of clumps, which may indicate the presence of bacteria, fungi, or other pathogens.

IDENTIFICATION:

- If microbial growth is observed, further tests are performed to identify the specific type of microorganism causing the infection. This information is crucial for determining the most effective antibiotic or antifungal treatment.

REPORTING RESULTS:

- Once the identification is complete, the lab sends a report to the healthcare provider detailing the type of microorganism present, along with information about its susceptibility to various antibiotics. This helps guide the selection of an appropriate treatment regimen.

NOTE:

- Blood cultures are important for diagnosing and managing bloodstream infections, which can be life-threatening if not promptly treated. The test results help healthcare providers make informed decisions about patient care, including the use of antibiotics or antifungal medications.

URINE CULTURE

- A urine culture is a diagnostic test performed to detect and identify any bacteria or other pathogens present in a urine sample. This test is commonly used to diagnose urinary tract infections (UTIs) and to guide appropriate treatment. Here's how the process typically works.

SAMPLE COLLECTION:

- A clean-catch midstream urine sample is usually collected. This involves cleaning the genital area and then collecting urine in a sterile container after the initial stream of urine has passed, which helps minimize contamination from the skin.

TRANSPORT TO LAB:

- The urine sample is promptly sent to a laboratory for analysis. It's important to transport the sample as soon as possible to maintain the viability of any bacteria present.

INOCULATION AND INCUBATION:

- In the lab, a small amount of urine is inoculated onto specific culture media that promote the growth of bacteria. These media may include agar plates or broth cultures. The cultures are then incubated at a controlled temperature (usually around 37°C) to allow any bacteria present to grow.

IDENTIFICATION:

- After incubation, microbiologists examine the culture plates or broth for the presence of bacterial growth. They identify the types of bacteria present using various techniques, such as microscopy, biochemical tests, or automated systems.

ANTIBIOTIC SENSITIVITY TESTING:

- In some cases, antibiotic sensitivity testing may be performed on the isolated bacteria. This test determines which antibiotics are effective in treating the infection by exposing the bacteria to different antibiotics and observing their response.

REPORTING RESULTS:

- The lab reports the results to the healthcare provider who ordered the test. The report typically includes the type of bacteria identified, the bacterial count (indicating the severity of the infection), and any antibiotic sensitivity information if applicable.

NOTE:

- Based on the urine culture results, healthcare providers can prescribe appropriate antibiotics or other treatments to address the specific infection. It's important to note that urine cultures are typically not needed for uncomplicated UTIs, but they are recommended for complicated cases, recurrent infections, or when the initial treatment is not effective.

STOOL CULTURE

- Stool culture refers to a diagnostic test conducted on a stool sample to identify bacterial, parasitic, or fungal infections in the digestive system. It is commonly used to diagnose gastrointestinal infections and related conditions.

SAMPLE COLLECTION:

- A small sample of stool is collected from the patient. It is important to collect a fresh sample and avoid any contamination during the collection process.

TRANSPORT TO LABORATORY:

- The stool sample is then transported to a laboratory for analysis. It is usually placed in a sterile container and sent to the lab as quickly as possible to maintain sample integrity.

CULTURE PREPARATION:

- In the laboratory, the stool sample is processed to isolate and identify any pathogens present. This may involve techniques such as culturing the sample on specific media that promote the growth of different types of microorganisms.

INCUBATION:

- The cultured sample is then incubated at specific temperatures to encourage the growth of bacteria, parasites, or fungi that may be causing the infection.

MICROSCOPIC EXAMINATION:

- After incubation, the microbiologist examines the cultures under a microscope to identify any pathogens present. They may also perform additional tests, such as biochemical tests, to further characterize the microorganisms.

REPORTING:

- Once the analysis is complete, the laboratory sends a report to the healthcare provider detailing the findings. This report helps the healthcare provider determine the appropriate treatment for the patient's condition.

NOTE:

- Stool culture is an essential tool in diagnosing gastrointestinal infections and guiding appropriate treatment. It helps healthcare providers identify the specific pathogens responsible for the infection, allowing for targeted therapy and better patient outcomes.

SPUTUM CULTURE

- A sputum culture is a laboratory test that examines a sample of sputum, which is the mucus that is coughed up from the lower respiratory tract (lungs and bronchi). This test is commonly done to identify and diagnose bacterial, fungal, or viral infections in the respiratory system.

SAMPLE COLLECTION:

- The patient is asked to cough deeply to produce sputum from the lower respiratory tract. The sputum is collected in a sterile container.

TRANSPORT TO THE LAB:

- The collected sample is then sent to the laboratory for analysis. It's important to transport the sample properly to maintain its integrity and prevent contamination.

SAMPLE PREPARATION:

- In the lab, the sputum sample is processed to remove any debris or saliva that might be present, ensuring that only the relevant components are analyzed.

CULTURE:

- The processed sample is then cultured on specific media that promote the growth of bacteria, fungi, or viruses. This allows the microorganisms in the sample to grow and form colonies.

IDENTIFICATION:

- Once colonies have grown, they are examined under a microscope and subjected to various tests to identify the specific microorganisms present. This may involve biochemical tests, genetic analysis, or other techniques depending on the suspected pathogens.

REPORTING:

- Finally, the laboratory generates a report detailing the findings of the sputum culture, including the type(s) of microorganisms present and their susceptibility to antibiotics or antifungal medications.

NOTE:

- Sputum cultures are particularly useful in diagnosing respiratory infections such as pneumonia, tuberculosis, bronchitis, and chronic obstructive pulmonary disease (COPD). The results of the culture help healthcare providers determine the most appropriate treatment for the infection, especially in cases where the cause is unclear or when initial treatments are not effective.

TISSUE CULTURE

- Tissue culture, also known as cell culture or in vitro culture, is a technique used in biology and biotechnology to grow and maintain cells outside their natural environment. This method involves taking cells from a plant or animal and placing them in a controlled environment with appropriate nutrients and conditions for growth.

PURPOSE:

- Tissue culture is used for various purposes such as studying cell behavior, producing genetically identical plants (cloning), testing drugs, studying viruses, and producing proteins or other products of interest.

PROCESS:

- Collection of cells or tissues from the organism of interest.
- Sterilization of the collected material to remove any contaminants.
- Placing the cells in a suitable nutrient medium that provides essential nutrients, vitamins, hormones, and growth factors.
- Providing optimal environmental conditions such as temperature, pH, and humidity for cell growth.
- Regular monitoring and maintenance of cultures to ensure healthy growth and prevent contamination.

APPLICATIONS:**➤ Plant Tissue Culture:**

- Used in agriculture and horticulture for mass propagation of plants, production of disease-free plants, and genetic modification of plants.

➤ **Animal Cell Culture:**

- Used in biomedical research, vaccine development, drug testing, and studying cell biology and physiology.

➤ **Microbial Culture:**

- Used for studying microorganisms, producing antibiotics, enzymes, and other biotechnological products.

BENEFITS:

- Allows researchers to study cell behavior in a controlled environment.
- Enables mass production of genetically identical organisms or cells.
- Provides a platform for testing drugs, vaccines, and other pharmaceutical products.
- Facilitates genetic engineering and biotechnological applications.

CHALLENGE

- Maintaining sterility is crucial to prevent contamination.
- Some cell types may be difficult to culture or require specialized conditions.
- Cost and labor-intensive process, especially for large-scale applications.

NOTE:

- Tissue culture is a powerful tool in biological research and biotechnology, offering opportunities for understanding cellular processes, developing new technologies, and producing valuable products for various industries.

WOUND SWAB

- A wound swab, also known as a wound culture or wound sampling, is a medical procedure in which a healthcare professional collects a sample from a wound for laboratory analysis. This procedure is commonly used to identify the type of bacteria or other microorganisms present in a wound, which helps guide appropriate treatment decisions, especially in cases of infection.

PREPARATION:

- The healthcare provider will gather necessary materials, including a sterile swab, sterile gloves, antiseptic solution, and a sterile container for the sample.

CLEANING:

- The area around the wound is cleaned with an antiseptic solution to reduce the risk of contamination during sampling.

SAMPLE COLLECTION:

- Using sterile technique, the healthcare provider uses a sterile swab to gently collect a sample from the wound bed. This may involve swabbing any visible pus or exudate and lightly pressing the swab against the wound to ensure a sufficient sample is obtained.

TRANSPORT:

- The swab is carefully placed into a sterile container, sealed, and labeled with the patient's information, the date and time of collection, and other relevant details.

LABORATORY ANALYSIS:

- The container with the wound swab sample is sent to a laboratory for analysis. Microbiologists culture the sample on appropriate media to grow and identify any bacteria or other pathogens present. The laboratory will generate a report detailing the types of microorganisms found and their susceptibility to various antibiotics.

TREATMENT GUIDANCE:

- Based on the laboratory results, healthcare providers can tailor treatment plans, such as prescribing antibiotics targeted at the specific pathogens causing the wound infection.

NOTE:

- wound swabs are just one tool in diagnosing and managing wound infections. Clinical judgment, patient history, and other diagnostic tests may also be used in conjunction with wound swabs to provide comprehensive care.

COVID SWAB

- In microbiology, a COVID swab refers to the sample collection method used to detect the SARS-CoV-2 virus, which causes COVID-19. This swab is typically collected from the respiratory tract, including the nasal cavity, throat, or both. The collected sample is then analyzed in a microbiology laboratory using various techniques to detect the presence of the virus.

SAMPLE COLLECTION:

- A healthcare professional collects a swab sample from the patient's nasal cavity, throat, or both. The swab is designed to capture cells and secretions that may contain the virus.

TRANSPORT MEDIUM:

- The swab sample is placed in a transport medium, which helps preserve the sample and keep it viable during transportation to the laboratory.

SAMPLE PROCESSING:

- In the laboratory, the swab sample is processed to extract genetic material (RNA) from any virus particles present. This step often involves specialized kits and equipment designed for RNA extraction.

REVERSE TRANSCRIPTION POLYMERASE CHAIN REACTION (RT-PCR):

- The extracted RNA is then subjected to RT-PCR analysis. RT-PCR is a highly sensitive technique used to amplify and detect specific genetic sequences, such as those unique to SARS-CoV-2.

ANALYSIS AND REPORTING:

- The RT-PCR results are analyzed, and if the target viral genetic sequences are detected above a certain threshold, the sample is considered positive for SARS-CoV-2. The laboratory then reports the results to the healthcare provider and/or public health authorities.

NOTE:

- Microbiology plays a crucial role in COVID-19 testing by providing accurate and timely results to aid in diagnosis, patient management, and public health measures.

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INTRODUCTION

BLOOD BANK:

- Blood banking is the process that takes place in the lab to make sure that donated bloods, or blood products, are safe before they are used in blood transfusions and other medical procedures. Blood banking includes typing the blood for transfusion and testing for infectious diseases.
- Facts about blood banking
- About 36,000 units of blood are needed every day.
- The number of blood units donated is about 13.6 million a year.
- About 6.8 million volunteers are blood donors each year.
- Each unit of blood is broken down into components, such as red blood cells, plasma, cryoprecipitated AHF, and platelets. One unit of whole blood, once it's separated, may be transfused to several patients, each with different needs.
- Annually, more than 21 million blood components are transfused.

BLOOD DONORS:

- Most blood donors are volunteers. However, sometimes, a patient may want to donate blood a couple of weeks before undergoing surgery, so that his or her blood is available in case of a blood transfusion. Donating blood for yourself is called an autologous donation.

DONOR SELECTION:

- Must be at least 16 years of age, or in accordance with state law
- Must be in good health
- Must weigh at least 110 pounds
- Must pass the physical and health history exam given before donation

DONOR REJECTION:

- Low blood pressure (13.6%)cupping (11.6%).
- Less hours of sleep in the night prior to donation (5.8%).
- Donor Have been tested HIV positive.

- Suffering from ailments like cardiac arrest, hypertension, blood pressure, cancer, epilepsy, kidney ailments and diabetes.
- Have asthma with active symptoms, and severe asthma patients.
- Were the major causes of rejection in this study.

BLOOD DONOR REQUEST FORM :

Madras Egmore Lions Blood Bank & Research Foundation

EGMORE : 130, Marshall Road, Egmore, Chennai - 600 034. Mob: 9941917929 Tel: 28414949 / 4859 / 5559 Web: www.lionsbloodbank.net

AMBATTUR : C-15, A.T.C. Road, Ambattur Industrial Estate, Chennai - 600 058 Tel: 49504959 Mob: 99419 17929 E-mail: info@lionsbloodbank.net

BLOOD DONOR CONSENT FORM

LOCATION: _____ DATE: _____

குடுதி கொடைகளைப் பூர்த்தி செய்ய உணர்வுபெற்று
TO BE FILLED BY DONOR

குடுதி கொடுக்கிறவருக்குப் பூர்த்தி செய்ய உணர்வுபெற்று
TO BE FILLED BY BLOOD BANK STAFF

TYPE OF DONOR: VOLUNTARY REPLACEMENT

Sign / Date: _____

Quar / Name: _____

Quar / Address: _____

மருத்துவ குடுதி / Email ID: _____

மருத்துவ குடுதி / Mobile No.: _____

மருத்துவ குடுதி / College or Company Address: _____

பாலினம்: குணம் Male Female எடையம் Weight

பிறந்த தேதி Date of Birth: _____ வயது Age

குணம் குடுதி / Blood Group: _____

கடைசியாக குடுதி கொடுத்த தேதி Last Donation Date: _____

குணம் குடுதி கொடுத்த தேதி Total No. of Donation: _____

மருத்துவ குடுதி கொடுத்த தேதி / உணர்வுபெற்று
When did you last test your blood?

பிரதான குணம் / PERMANENT DEFERRAL

1. உயர் குணம் குடுதி கொடுத்த தேதி / உணர்வுபெற்று
H/O Uncontrolled Blood Pressure / Stroke?

2. குணம் குடுதி கொடுத்த தேதி / உணர்வுபெற்று
H/O Heart Disease or Anti Arrhythmic?

3. குணம் குடுதி கொடுத்த தேதி / உணர்வுபெற்று
H/O Epilepsy or Anticonvulsants or Cytotoxic drugs?

4. குணம் குடுதி கொடுத்த தேதி / உணர்வுபெற்று
H/O Abnormal bleeding tendencies / Enzyme Deficiencies with known history of Hemophilia?

5. குணம் குடுதி கொடுத்த தேதி / உணர்வுபெற்று
H/O Diabetes mellitus or treatment with Insulin or Hypoglycemic drugs?

6. குணம் குடுதி கொடுத்த தேதி / உணர்வுபெற்று
H/O Chronic liver disease or endocrine disorders / Chronic kidney disease?

7. குணம் குடுதி கொடுத்த தேதி / உணர்வுபெற்று
H/O Parkinson's disease?

8. குணம் குடுதி கொடுத்த தேதி / உணர்வுபெற்று
H/O Psychiatric disorders / Schizophrenia?

9. குணம் குடுதி கொடுத்த தேதி / உணர்வுபெற்று
H/O Major surgeries for Kidney, Heart, Liver or Brain?

10. குணம் குடுதி கொடுத்த தேதி / உணர்வுபெற்று
H/O severe allergic disorders or Automatic on steroid therapy?

11. குணம் குடுதி கொடுத்த தேதி / உணர்வுபெற்று
H/O Injection Drug users / Transgender / Female Sex Workers / Persons with Multiple Sex Partners / Homosexual / STD / AIDS?

12. குணம் குடுதி கொடுத்த தேதி / உணர்வுபெற்று
H/O Gonorrhea Disease / Syphilis?

13. குணம் குடுதி கொடுத்த தேதி / உணர்வுபெற்று
H/O Leishmaniasis disease / Leprosy?

14. குணம் குடுதி கொடுத்த தேதி / உணர்வுபெற்று
H/O Cancer disease / Surgery for cancer?

15. குணம் குடுதி கொடுத்த தேதி / உணர்வுபெற்று
H/O Autoimmune diseases like SLE, RA, Ankylosing Spondylitis, Dermatomyositis, Scleroderma?

16. குணம் குடுதி கொடுத்த தேதி / உணர்வுபெற்று
H/O 2 Consecutive faints following a blood donation?

17. குணம் குடுதி கொடுத்த தேதி / உணர்வுபெற்று
H/O Recipients of organ / System Cells / Tissue Transplant?

FIGURE1

குடுதி கொடுக்கிறவருக்குப் பூர்த்தி செய்ய உணர்வுபெற்று / BLOOD DONOR QUESTIONNAIRE

குணம் குடுதி கொடுத்த தேதி / உணர்வுபெற்று
IN THE PAST 2 YEARS HAVE YOU

குணம் குடுதி கொடுத்த தேதி / உணர்வுபெற்று
Have you been treated for Tuberculosis / Osteomyelitis in the past 2 years?

குணம் குடுதி கொடுத்த தேதி / உணர்வுபெற்று
IN THE PAST 12 MONTHS HAVE YOU

குணம் குடுதி கொடுத்த தேதி / உணர்வுபெற்று
Received transfusion of blood or plasma?

குணம் குடுதி கொடுத்த தேதி / உணர்வுபெற்று
Suffered from Hepatitis B or had close contact with an individual suffering from Hepatitis?

குணம் குடுதி கொடுத்த தேதி / உணர்வுபெற்று
Had exposure to Tattoos / Acupuncture or body piercing / GI Endoscopy?

குணம் குடுதி கொடுத்த தேதி / உணர்வுபெற்று
Undergone any major surgery or met with any major accident?

குணம் குடுதி கொடுத்த தேதி / உணர்வுபெற்று
Treated for a stop bite / Had anti rabies vaccine?

குணம் குடுதி கொடுத்த தேதி / உணர்வுபெற்று
Suffered from Jaundice / Typhoid / Malaria?

குணம் குடுதி கொடுத்த தேதி / உணர்வுபெற்று
IN THE PAST 6 MONTHS HAVE YOU

குணம் குடுதி கொடுத்த தேதி / உணர்வுபெற்று
Dental surgery under anesthesia / minor surgery / Tooth extraction / Dutasteride for BPH?

குணம் குடுதி கொடுத்த தேதி / உணர்வுபெற்று
IN THE PAST 3 MONTHS HAVE YOU

குணம் குடுதி கொடுத்த தேதி / உணர்வுபெற்று
Are you treated for Malaria?

குணம் குடுதி கொடுத்த தேதி / உணர்வுபெற்று
IN THE PAST 4 WEEKS HAVE YOU

குணம் குடுதி கொடுத்த தேதி / உணர்வுபெற்று
Had treatment for Acne with isotretinoin / Retinoids for BPH?

குணம் குடுதி கொடுத்த தேதி / உணர்வுபெற்று
Had Anti-Tetanus Serum / Anti-Snake Venom / Anti-Diphtheria Serum / Anti Gas Gangrene Serum / Rubella / Polio / Measles / Mumps / Yellow Fever / Chicken Pox / Japanese Encephalitis?

குணம் குடுதி கொடுத்த தேதி / உணர்வுபெற்று
IN THE PAST 2 WEEKS HAVE YOU HAD ANTIBIOTICS? HAD TETANUS / INFLUENZA / SWINE FLU VACCINATION?

குணம் குடுதி கொடுத்த தேதி / உணர்வுபெற்று
IN THE PAST 24 HOURS HAVE YOU ALCOHOLIC DRINKS?

குணம் குடுதி கொடுத்த தேதி / உணர்வுபெற்று
Are you an Air Crew / A Heavy Machine Vehicle Driver / A Construction Worker?

குணம் குடுதி கொடுத்த தேதி / உணர்வுபெற்று
IN THE PAST 30 MINUTES HAVE YOU SMOKED?

குணம் குடுதி கொடுத்த தேதி / உணர்வுபெற்று
ONLY FOR FEMALES (IN THE PAST 6 MONTHS)

குணம் குடுதி கொடுத்த தேதி / உணர்வுபெற்று
IN THE PAST ONE WEEK

குணம் குடுதி கொடுத்த தேதி / உணர்வுபெற்று
Have you had Ketocoazole / antithrombotic drugs?

குணம் குடுதி கொடுத்த தேதி / உணர்வுபெற்று

குணம் குடுதி கொடுத்த தேதி / உணர்வுபெற்று
I wish / do not wish to be intimated of my screening test results. I have no objection in my blood subjected to plasma fractionation.

குணம் குடுதி கொடுத்த தேதி / உணர்வுபெற்று
Signature of the Donor

FIGURE2

BLOOD BAG

TYPES OF BLOOD BAGS:

- ✧ Single Bag
- ✧ Double Bag
- ✧ Triple Bag

SINGLE BAG:

- For whole blood collection. The contains CPDA(citrate-phosphate-dextrose-adenine) solution available capacity of 350ml and 450ml.

DOUBLE BAG:

- For whole blood collection. Separation of two different blood components (Red Blood Cells and Plasma) obtained through the process of centrifugation and extraction.

TRIPLE BAG:

- Triple blood bag with SAGM ,for whole blood collection. Separation of three blood components(Red Blood Cells, Plasma and Platelets).
- The primary bag contains CPD(Cephalopelvic Disproportion) and one satellite bag contains SAGM(Saline, Adenine, Glucose, Mannitol).

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.
- Whole blood donation is the most common type of blood donation. During this donation, you donate about a pint (about half a liter) of whole blood. The blood is then separated into its components — red cells, plasma and sometimes platelets.
- Blood is essential to help patients survive surgeries, cancer treatment, chronic illnesses, and traumatic injuries. This lifesaving care starts with one person making a generous donation.
- Safe blood saves lives. Blood is needed by women with complications during pregnancy and childbirth, children with severe anaemia, often resulting from malaria or malnutrition, accident victims and surgical and cancer patients.

BLOOD DONATION



FIGURE3

DONOR COUNSELING

- A blood transfusion service is an essential element of a health-care system and individuals who donate their blood provide a unique contribution to saving lives and improving patient health.
- Blood donors should be provided with high standards of care and assurance of their health and safety.
- Blood 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.

BLOOD GROUPING



FIGURE4



FIGURE5

BLOOD GROUPING

- According to the Blood Banks, distribution of blood types includes the following:
 - ✧ “O” Rh-positive - 39%
 - ✧ “O” Rh-negative - 9%
 - ✧ “A” Rh-positive - 31%
 - ✧ “A” Rh-negative - 6%
 - ✧ “B” Rh-positive - 9%
 - ✧ “B” Rh-negative - 2%
 - ✧ “AB” Rh-negative - 1%
 - ✧ “AB” Rh-positive - 3
- **56** Screening for any unexpected red blood cell antibodies that may cause problems in the recipient
- Screening for current or past infections, including:
 - ✧ Human immunodeficiency virus (HIV)
 - ✧ Hepatitis viruses B
 - ✧ Hepatitis viruses C
 - ✧ Syphilis
 - ✧ Malaria

HUMEN IMMUNODEFICIENCY VIRUS:

- HIV (human immunodeficiency virus) is a virus that attacks the body's immune system. If HIV is not treated, it can lead to AIDS (acquired immunodeficiency syndrome). There is currently no effective cure. Once people get HIV, they have it for life. But with proper medical care, HIV can be controlled.

HEPATITIS B VIRUSES:

- Hepatitis B is a vaccine-preventable liver infection caused by the hepatitis B virus (HBV). Hepatitis B is spread when blood, semen, or other body fluids from a person infected with the virus enters the body of someone who is not infected.

HEPATITIS C VIRUSES:

- Hepatitis C is a liver infection caused by the hepatitis C virus (HCV). Hepatitis C is spread through contact with blood from an infected person. Today, most people become infected with the hepatitis C virus by sharing needles or other equipment used to prepare and inject drugs.

SYPHILIS:

- Syphilis is a bacterial infection usually spread by sexual contact. The disease starts as a painless sore — typically on the genitals, rectum or mouth. Syphilis spreads from person to person via skin or mucous membrane contact with these sores.

MALARIA:

- Malaria is a disease caused by a parasite. The parasite is spread to humans through the bites of infected mosquitoes. People who have malaria usually feel very sick with a high fever and shaking chills. While the disease is uncommon in temperate climates, malaria is still common in tropical and subtropical countries.



FIGURE6



FIGURE7



FIGURE8

BLOOD COMPONENTS SEPRATION

COMPONENTS SEPRATION:

- The whole blood which is a mixture of cells, colloids and crystalloids can be separated into different blood components namely packed red blood cell (PR
- BC) concentrate, platelet concentrate, fresh frozen plasma and cryoprecipitate.
- Blood cells from plasma can be separated by the process of centrifugation.
- All blood components are stored at refrigerator.
- The storage temperature for red cells is between $+2^{\circ}\text{C}$ and $+6^{\circ}\text{C}$, for Platelets and leucocytes- between $+20^{\circ}\text{C}$ and $+24^{\circ}\text{C}$ and for plasma products, below -18°C

COMPONENTS SEPRATION:



FIGURE9



FIGURE10

STORAGE OF BLOOD SPECIMEN

STORAGE:

- All blood components are stored at refrigerator.
- The storage temperature for red cells is between $+2^{\circ}\text{C}$ and $+6^{\circ}\text{C}$, for Platelets and leucocytes- between $+20^{\circ}\text{C}$ and $+24^{\circ}\text{C}$ and for plasma products, below -18°C .

SELF LIFE:

- Whole blood - 35 days
- PRBC - 35-42days
- FFP - 1year
- Platelet - 5days
- Cryoprecipitate - 1year



FIGURE11

BLOOD ISSUING

PROCEDURE:

- Donor blood type on units, Transfusion Record and Unit Issue screen of BBIS. Donor unit number on unit, Transfusion Record form, Unit Issue screen of BBIS and Blood Release form.
- Compatibility testing results on Transfusion Record form. Patient name and hospital ID number on Blood Release form, Transfusion Record Form Unit Issue screen of BBIS.
- BB ID number on Blood Release form, Transfusion Record form, and unit tag.
- Expiration date/time on unit and Transfusion Record form. Doctor's Orders for Blood/Blood Product has been received by the BTS and checked for unit quantity and product.
- Tech must ensure an order for transfusion exists prior to releasing blood/blood product. Special Requirements indicated by "Patient Instructions", such as irradiation, antigen-negative are met.
- During the sign-out procedure the Blood Release form is completed with the unit number, time, date and the transporter's signature.
- The BTS technologist and the transporter must confirm agreement between the donor unit number and blood transfusion.



FIGURE12

CROSS MATCHING

MAJOR CROSS MATCHING:

- Prepare 1% red cells suspension (Donor cells) and add 10 micro liter packed cells to 1 ml of lies.
- Add 50 micro liter of donor cells suspension 1% to the appropriate microtube.
- Add 25 micro liter of the recipients plasma or serum to the appropriate microtube
- Incubate at 37°C for 15 minutes in a dry incubator
- CENTRIFIUGE THE CARD FOR 10 MINUTES IN THE ID CENTRIFIUGE READ THE REACTIONS

MINOR CROSS MATCHING:

- Prepare 1% red cells suspension (Donor cells) and add 10 micro liter packed cells to 1 ml of lies.
- Add 50 micro liter of recipients cells 1% to the appropriate microtube.
- Add 25 micro liter of the donors plasma or serum to the appropriate microtube
- Incubate at 37°C for 15 minutes in a dry incubator
- Centrifuge the card for 10 minutes in the ID centrifuge read the reactions

INTERPRETATION OF RESULTS:

Positive result implies incompatible:

- Agglutinated red blood cells form a band at the top of the bond columns

Negative result implies compatible:

- All red cells pass through and form a coombs bottom at the bottom of the bond columns.



FIGURE13



FIGURE14



FIGURE15

BLOOD BANK RECORDS

MANAGEMENT:

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

FOR EACH BLOOD COMPONENT ISSUED, A RECORD SYSTEM SHALL BE IN PLACE WHICH DOCUMENTS :

- Recipient's name and identification number
- Recipient's ABO group
- Recipients Rh group
- Identification number and name of blood component
- ABO group of the blood component
- Rh group of the blood component for red cells, platelets and granulocytes
- Compatibility verification for red cells and granulocytes
- Visual inspection

- Date and time of issue
- Identity of the person issuing the blood component
- Identity of the person transporting the blood component to the
- recipient's location

FOR EACH BLOOD PRODUCT ISSUED , A RECORD SYSTEM SHALL BE IN PLACE WHICH DOCUMENTS:

- Recipient's name and identification number
- Blood product name and manufacturer
- Lot number
- Volume and /or potency
- Dosage/vials issued
- Visual inspection
- Date and time of issue
- Identity of the person issuing the blood product.
- Identity of the person transporting the blood product to the
- recipient's location.
- ✧ Records of inspection of blood components and blood products prior to issue shall be retained for five years.
- ✧ Records for all facilities shall ensure that it is possible for blood components and blood products to be traced from its source to final disposition. The record system must provide a means to locate and access all records related to a given blood component or blood product. These records must be kept indefinitely. The Transfusion Medicine Laboratory shall develop and maintain records that demonstrate that the quality system is operating in an effective manner.
- ✧ Healthcare employee signatures, initials and computer identification shall be retained for ten years.

S.no	Time	Donor Id	Unit	Wgt	Quantity	S/N	MO
⑦		LD1280800	VD	DB	450	✓	
⑧		LD1280798	VD	DB	400	✓	
⑨		LD1280160	VD	DB	350	✓	
28/11/22							
⑩	1:00	LD1280793	VD	DB	450	✓	
		LD1280792	VD	DB	450		
		LD1280789					
29/11/22							
⑪	04:39	LD1280801	VD	DB	450	✓	
⑫	5:30	LD1280802	VD	DB	450	✓	
⑬	6:00	LD1280803	VD	DB	450	✓	
30/11/22							
1.	5:40	LD1280794	VD	DB	450	✓	

FIGURE16

CONCLUSION :

- Blood transfusion or its products is an invaluable therapeutic measure which should be with good reasons because of its potential hazards.
- Therefore a well-organised blood transfusion service ,
- Blood loss in during a surgical procedure should be minimized.
- RBC booster should be given pre and postoperatively to patients.
- This report presents the blood bank management system related issues.
- Problem to calculate amount of blood in stock.
- Difficulty in identifying blood expiry date.
- DAY 1: I observed the blood group and cross matching.
- DAY2: The next day I did the blood type and cross match.
- DAY3: The next day I observed the method of separating plasma from whole blood.
- DAY4: The next day I performed a procedure to separate plasma from whole blood.
- DAY5:The next day I abserved for screen tests procedure, HIV,HBsAg,HBC,VDRL,MALARIA.
- DAY6: I went to the blood camp on the last day where I checked the blood levels of the donors.

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Sharing Life. Saving Lives..since 1984



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

Date: 12th Dec 2022

TO WHOMSOEVER IT MAY CONCERN

This is to certify that Ms. Mahalakshmi. 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 28th Nov 2022 to 3rd Dec 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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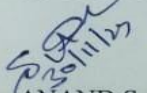
30.11.2023

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Ms.MAHALAKSHMIS.M** (Reg.No.41737007), B.Sc (MLT) student of Sathyabama Institute of Science and Technology had done her internship in the Department of Laboratory for the period from 01.11.2023 to 30.11.2023 at our Institution.

We wish her all the best for her future endeavors.

For THE VOLUNTARY HEALTH SERVICES


ANAND.S
DGM – HR



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