IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
Volume 3, Issue 1, February 2023
Impact Factor: 7.301

Review on Pathology of Blood and Blood Related Diseases

Monika G. Shinde[1], Sanjay K. Bais[2], Rahul D. Devadkar[1]
Fabtech College of Pharmacy, Sangola, Solapur, Maharashtra, India

Abstract: *Clinical pathology is a field of study through which we diagnose and analyze disease and disorders using tissues of our body and fluids produced by human body. It requires knowledge in many fields like biochemistry, microbiology, hematology and etc. It is a very crucial in the medical field as it is most often the primary step in treating a patient. As it gives information an identification of the disease the patient is suffering from and take the necessary protocols to treat him efficiently. The tests done are performed in a lab or a medical center. The tests usually require a wide array of equipment and chemicals. The tests are carried out by trained professionals who can use the equipment correctly to produce accurate test results. There are many divisions of clinical pathology some of are*

1. Chemical pathology
2. Immunopathology
3. Clinical microbiology
4. Hematopathology.

Keywords: Clinical pathology

Objective:
1) To study the instrument
2) To study the blood born diseases

I. INTRODUCTION

Pathology means the study of disease and causes and progression. Pathology tests cover blood tests, and tests on urine, and bodily tissues. If you're sick many of the decisions about your care will be based on the results of your blood and pathology test. A pathologist interprets the results of blood and pathology tests and looks for abnormalities that may point disease, such as cancer and other clinical illnesses, or health risks, such as pre-diabetes.

Clinical Chemistry of Blood

Clinical Chemistry is also known as chemical pathology, clinical biochemistry or medical biochemistry is the area of chemistry that generally concerns the analysis of body fluid for diagnostic therapeutic purposes. It is an applied form of biochemistry (not to be confused with medicinal chemistry, which involves basic research for drug development). A clinical chemistry analyzer; hand shows size. The discipline originated in the 19th century with the use of simple chemical reaction tests for various components of blood and urine. In the many decades since, other techniques have been applied as science and technology have advanced, including the use and measurement of enzyme activities, electrophoresis, spectrophotometry, and immunoassay. There are now many blood tests and clinical urine tests with extensive diagnostic capabilities. Most current laboratories are now highly automated to accommodate the high workload typical of a hospital laboratory. Tests performed are closely monitored and quality controlled.

All biochemical tests come under chemical pathology. These are performed on any kind of body fluid, but mostly on serum or plasma. The Serum is the yellow watery part of blood that is left after blood has been allowed to clot and all blood cells have been removed. This is most easily done by centrifugation, which packs the denser blood cells and platelets to the bottom of the centrifuge tube, leaving the liquid serum fraction resting above the packed cells. This initial step before analysis has recently been included in instruments that operate on the "integrated system" principle. Plasma

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
Volume 3, Issue 1, February 2023
Impact Factor: 7.301

is in essence the same as a serum but is obtained by centrifuging the blood without clotting. Plasma is obtained by centrifugation before clotting occurs .The type of test required dictates what type of sample is used.

A large medical laboratory will accept samples for up to about 700 different kinds of tests. Even the largest of laboratories rarely do all these tests themselves, and some must be referred to other labs. This large array of tests can be categorized into sub-specialties of

- Special chemistry-elaborate techniques such as electrophoresis, and manual testing methods.
- General or routine chemistry-commonly ordered blood chemistries (e.g., liver and kidney function tests).
- Toxicology-the study of drugs of abuse and other chemicals.
- Clinical endocrinology- the study of hormones, and diagnosis of endocrine disorders.
- Urinalysis-chemical analysis of urine for a wide array of diseases, along with other fluids such as CSF and effusions
- Fecal analysis- Mostly for detection of gastrointestinal disorders.
- Therapeutic Drug Monitoring-measurement of therapeutic medication levels to optimize dosage.

Several simple chemical test sare used to detect and quantify different compounds in blood and urine, the most commonly tested specimens in clinical chemistry. Techniques such asspectrophotometry, immunoassays, and electrophoresis are also used in clinical chemistryto measure the concentration of substances such as hormones, proteins, glucose, lipids, electrolytes, enzymes, and other metabolic products present in human blood and urine.

Key parameters and their significance

Lipids

Initial step before analysis has recently been included in instruments thatoperate on the "integrated system" principle. Plasma is in essence the same as a serum butis obtained by centrifuging the blood without clotting. Plasma is obtained by centrifugation before clotting occurs .The type of test required dictates what type of sample is used.

A large medical laboratory will accept samples for up to about 700 different kinds of tests.Even the largest of laboratories rarely do all these tests themselves, and some must be referred to other labs. This large array of tests can be categorized into sub-specialties of

- Special chemistry-elaborate techniques such as electrophoresis, and manual testing methods.
- General or routine chemistry-commonly ordered blood chemistries (e.g., liver and kidney function tests).
- Toxicology-the study of drugs of abuse and other chemicals.
- Clinical endocrinology- the study of hormones, and diagnosis of endocrine disorders.
- Urinalysis-chemical analysis of urine for a wide array of diseases, along with other fluids such as CSF and effusions
- Fecal analysis- Mostly for detection of gastrointestinal disorders.
- Therapeutic Drug Monitoring-measurement of therapeutic medication levels to optimize dosage.

Several simple chemical test sare used to detect and quantify different compounds in blood and urine, the most commonly tested specimens in clinical chemistry. Techniques such asspectrophotometry, immunoassays, and electrophoresis are also used in clinical chemistryto measure the concentration of substances such as hormones, proteins, glucose, lipids, electrolytes, enzymes, and other metabolic products present in human blood and urine.

Key parameters and their significance

Lipids

The concentration of proteins in the body can be indicative of nutritional and metabolic disorders and some forms of cancer. For example, total protein and albumin levels help diagnose liver or kidney disease in addition to malnutrition. Globulin levels and the ratio of albumin to globulin can help detect infection, inflammation, autoimmune disease, and some forms of blood cancer.

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
Volume 3, Issue 1, February 2023
Impact Factor: 7.301

Metabolites

Some metabolic products can be measured to assess the functioning of certain organs. For example, levels of urea, nitrogen, and creatinine in the blood are indicators of kidney function. Similarly, uric acid levels can signal kidney disease, gout, and damage to other tissues. Blood and urine tests that give abnormal results are usually repeated to make sure there is no sample or lab error and are also followed up by more specialized clinical tests.

II. ERYTHROCYTES ABNORMAL CELLS AND THEIR SIGNIFICANCE

Erythrocytes

Erythrocytes are derived from bone marrow ortho-chromic erythroblasts following extrusion of the nucleus. During development in the bone marrow, erythroid cells increasein RNA content for hemoglobin production; this RNA imparts a grayish color to the cellcytoplasm on the Wright-Giemsa stain. As hemoglobin is produced, the cytoplasmic color progressively becomes more orange-pink. Upon release into the circulation, erythrocytes are still slightly immature with slight grayish staining, a finding refer red to as polychr omasia.

Abnormalities of Erythrocytes

Primary abnormalities of the erythrocyte membrane led to a variety of clinical syndromes including hereditary spherocytosis, hereditary elliptocytosis, and related disorders. Clinical and laboratory manifestations, as well as associated molecular defects, of these disorders, vary widely.

Erythrocytes give their significance in Human Body

A type of blood cell that is made in the bone marrow and found in the blood. Erythrocytes contain a protein called hemoglobin, which carries oxygen from the lungs to all parts of the body. Anemia is the most common blood condition in the U.S. It affects almost 6% of thepopulation, women, young children, and people with long-term diseases are more likely tohave anemia. Important things to remember are: Certain forms of anemia are passed down through your genes, and infants may have it from birth. Women are at risk of iron deficiency anemia because of blood loss from their periods and higher blood supply demands during pregnancy. Older adults have a greater risk of anemia because they are more likely to have kidney disease or other chronic medical conditions.

There are many types of anemia. All have different causes and treatments. Some forms --like the mild anemia that happens during pregnancy aren't a major concern. But some typesof anemia may reflect a serious underlying medical condition

Anemia Symptoms

The signs of anemia can be so mild that you might not even notice them .At a certain point .As your blood cells decrease,

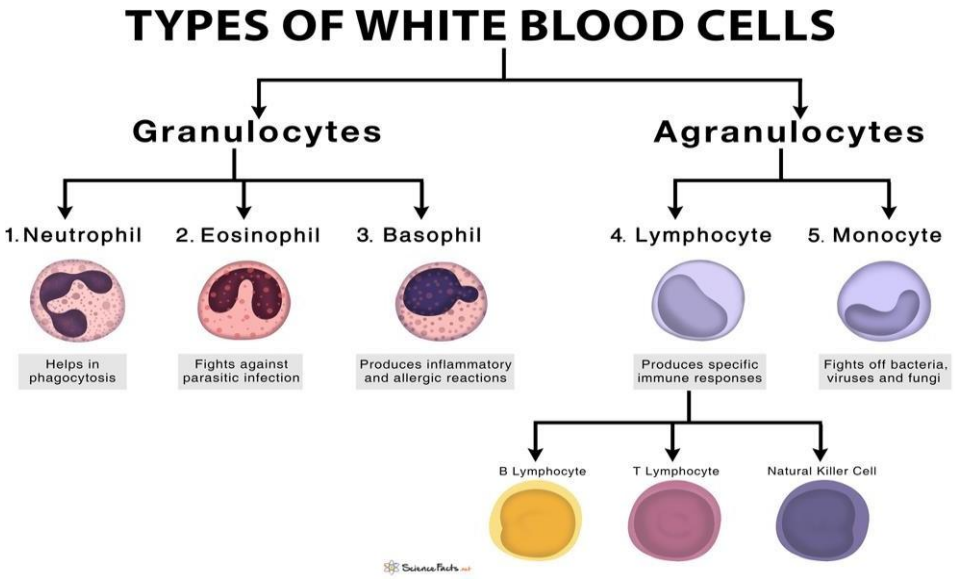
IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
Volume 3, Issue 1, February 2023
Impact Factor: 7.301

symptoms often develop. Depending on the cause of the anemia symptoms may include:

Headache

- Dizziness
- Tirednessorweakness
- Fast
- Problems with growth ,for children and teen so Shortness of breath
- Pale skin
- Coldhands andfeet
- Pain, Including in your bones ,chest, belly and joints

Anemia Types and causes
There are more than 400 types of anemia, and they're divided into three groups: Anemia is caused by blood loss.
Anemia is caused by decreased or faulty red blood cell production.
Anemia caused by the destruction of red blood cells Anemia Caused by Blood Loss. You can lose red blood cells through bleeding. This can happen slowly over along period, and
You might not notice. Causes can include:
Non-steroidal anti-inflammatory drugs (NSAIDs) such as aspirin or ibuprofen, which can cause ulcers and gastritis.
Gastrointestinalconditionssuchasulcers,hemorrhoids,gastritis(inflammationofyourstomach)andcancer.
A woman's period, especially if you have heavy menstruation (or heavy period). This can be associated with fibroids.
Post trauma or post-surgery as well.



III. DISORDER OF WBC

White blood cells disorders occur when you have too many or too few white blood cells.White blood cells, also known as leukocytes, are one of four types of cells that make upblood. They are produced in the bone marrow and play an important role in your immunesystem. Doctors can measure these cells with a test called a white blood cell (WBC) count.When white blood cells are abnormally high, it usually suggests that your immune system isfighting a disease or infection. When they are too low, it suggests that a disease,autoimmune disorder, or other condition has weakened your immune system. While youcannot diagnose any medical condition based on a white blood cell count, the test can oftenbe the first signof a disease andevenhintat what kind of disease you have.

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
Volume 3, Issue 1, February 2023
Impact Factor: 7.301

Adisorderreferstoanyconditionthatdisruptsthenormalfunctioningofthebody.Whitebloodcell isordersfallintotwocategories:
Neutrophils:Bloodcellsthatmainlyfightbacterialinfections
Eosinophils:Bloodcellsthatmainlyfightparasiticinfections
Basophils: Blood cells that help trigger inflammation to fight infections, diseases ortoxins.
Leukopenia: A decrease in white blood cells, which can be caused by cells beingdestroyedorbynotenoughcellsbeingmade.
Leukocytosis:An increasein whiteblood cells,which can beanormal responseofthe immune system but also caused by certain cancerous or non-cancerous diseases.There are also five major types of white blood cells, each of which has a specificfunction
Monocytes: Frontline defenders that attack anything the immune system considers abnormal Lymphocytes: Blood cellsthatproduceimmuneproteinscalledantibodiesthattargetandfight specific disease-causing organisms Some diseases only affect one type of white blood cell, while others affect many. Forinstance,lymphocyticleukocytosisonlyaffectslymphocytes,whileneutrophilicleukocytosisonly affects neutrophils.3 The type of cells affected can help doctors figure out what type of condition they are dealing with.

Symptoms

Symptoms of white blood cell disorders can vary based on the underlying cause, although some people may be asymptomatic (without symptoms). If symptoms develop, they canoften be non-specific. There can even be an overlap in symptoms between leukopenia andleukocytosis.

Leukopenia

Fever, Chills, Fatigue, Light he adedness or dizziness, Sweating. A general feeling of unwellness, Body aches, Cough, Sore throat, Trouble breathing.

Leukocytosis

Trouble breathing. Fever. Fatigue. Bleeding, bruising Lightheadednessordizziness.
Sweating.Painortinglingintheleg s,arms.Visionproblems,Unclearthinking.Lossofappetite

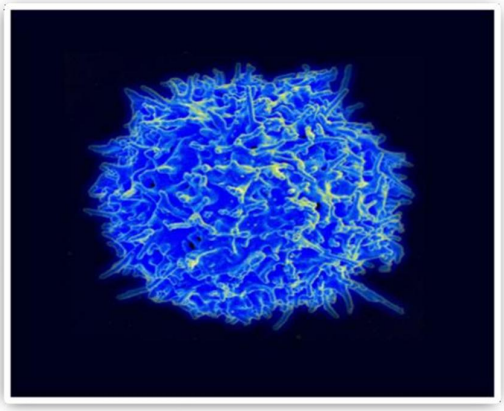
Causes

There are many different causes of white blood cell disorders. Some are due to a severe infection, an autoimmune disease, genetics, or cancers affecting blood cells or bonemarrow.Othersaretreatment-relatedorarecausedbyproblemswithothertypesofbloodcells, such as red blood cells. Some are entirely idiopathic, the meaning of unknown origin.Some of thewhite bloodcelldisorders associatedwithleukopenia include:

1. Autoimmune neutropenia: A condition in which your immune system mistakenly attacks and destroysneutrophils
2. Aplasticanemia:Arareconditioninwhichthebodystopsproducingenoughnew.
3. Congenital neutropenia: A genetic disorder in which the body doesn't make enoughbloodcellsneutrophils
4. Chronicgranulomatousdisease:Ageneticdisorderthatcausescertainwhitebloodcellstomalfunctionandbehave abnormally
5. Cyclic neutropenia: A rare genetic disorder in which neutrophil production dropsevery 21daysorso.

LymphocytesandPlatelets,theirroleinhealthanddiseases
Lymphocytes:
Asmallwhitebloodcell(leukocyte)playsalargeroleindefending thebodyagainstdisease.
Lymphocytes are responsible for immune responses. There are two main types oflymphocytes: B cells and T cells. The B cells make antibodies that attack bacteria and toxinswhile the T cells attack body cells themselves when they have been taken over by viruses orhave become cancerous. Lymphocytes secrete products (lymphokines) that modulate thefunctional activities of many other types of cells and are often present at sites of chronicinflammation

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
Volume 3, Issue 1, February 2023
Impact Factor: 7.301



Platelets

Platelets are tiny blood cells that help your body form clots to stop bleeding. If one of yourblood vessels gets damaged, it sends out signals to the platelets. The platelets then rush tothe site ofdamage andforma plug(clot)tofixthe damage.
The process of spreading across the surface of a damaged blood vessel to stop bleeding iscalled adhesion. This is because when platelets get to the site of the injury, they grow stickytentacles that help them stick (adhere) to one another. They also send out chemical signalsto attract more platelets. The additional platelets pile onto the clot in a process called aggregation

Clinical Chemistry of Urine

Physical examination of urine includes a description of the volume, color, clarity, odor, andspecific gravity. Chemical examination of urine includes the identification of protein, nitrites,bloodcells,glucose,pH,ketonebodies,andleukocyteesterase, bilirubin,urobilinogen,Urine is an aqueous solution of greater than 95% water. Other constituents include sodium,potassium, urea, chloride, creatinine and other dissolved ions, and inorganic and organiccompounds.Ureais anon-toxicmoleculemade oftoxicammoniaandcarbondioxide.

Abnormal constituents of urine and their significance in diseases

The analysis of urine for both normal and abnormal constituents is of great help inbiochemical analysis in understanding the health status and following up the necessarytreatment and its supervision. The normal constituents of the urine include inorganicsubstances like calcium, sodium, potassium, chlorides, and organic constituents like urea,uric acid, creatinine, etc. The abnormal constituents of urine that are found in pathologicalconditionsareproteinslikealbumin,carbohydrateslikeglucose,ketonebodieslikeacetone.acetoaceticacidandbeta-hydroxybutyricacid,bilesalts andbilepigments andblood.
Abnormalconstituentsoftheurinearebilesalts,bilepigments,sugar,proteins,blood,andketonebodies.ItisobservedinDiabetes mellitus,Diabetes insipidus.Addison'sdisease.
Chronic progressive renal failure, excess water intake, intake of diuretics like caffeine,alcohol,etc.
Any abnormal constituents found in urine are an indication of disease. The presence of redblood cells in urine is referred to as hematuria. The presence of proteins, which are normallytoo large to pass through the tubules, can be an indication of damage to the tubules and iscalledproteinuria.

Proteinuria

ItmeansthepresenceofproteinintheurineNormalurineinallanimalspeciescontainsalittle or small amount of protein from the desquamation of epithelial cells and othersources, but the amount is insufficient to produce a positive reaction to the standard test Proteinuria has usually associated with the following disease conditions. Hemoglobinuria,myoglobinuria, hematuria. Glomerulonephritis, renal infarction, nephrosis, amyloidosis,congestive heart failure.

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
Volume 3, Issue 1, February 2023
Impact Factor: 7.301

Hematuria
Itisthepresenceofintactbloodcellsintheurine.Itmayappear asgrossbloodclotspassedat the beginning, during, or at the end of urination or as more uniformed discoloration oftheurine throughouttheurination without clots. Iflargeclotsarepresent,obstructionof
U.T.mayoccur,resulting instranguryanddysuria.

Crystalluria:
It is the presence of crystals in the urine of herbivorous animals has no special significanceunless they occur in large numbers and one associated with irritation of U.T. It may occurwithnoclinicalsigns ormayindicateasevere probleminrenaltissuesorU.T.infection.

Casts and cells
Casts are organized, tubular structures, which vary in appearance depending on theircomposition. They occur only when the kidneys are involved in the disease process. Theypresent as an indication of inflammatory or degenerative changes in the kidney where theyare formed by theagglomerationofdesquamatedcellsandprotein.

Pyuria
Itisthepresenceofpurulentdebrisintheurine.Pyuriaindicatesaninflammatoryexudationatanypointoftheurinarytract,usuallyr enalpelvisandbladder.Thispurulentdebris mayappear in the form of grass clots or shreds or only be detectable by microscopicexamination. Pyuria is usually accompanied by the presence of bacteria in the urine. Also,dysuria.stranguria andcrystalluria areevident

Myoglobinuria
It is the presence of myoglobin in the urine. Myoglobinuria is good evidence of severemusculardestructionsuchasinazoturiainhorses.Itmaybeobservedinenzooticmusculardystrophy but the amount of myoglobin in such young animals is insufficient to cause theproblem.

Hemoglobinuria:
It is defined as the presence of hemoglobin in the urine. False hemoglobinuria occurs withcases of hematuria when the R.B. Cs are destroyed and liberate their contents ofhemoglobin into the urine. Meanwhile, true hemoglobinuria is manifested by deep reddiscoloration of the urine caused by lysis of R.B. Cs due to many diseases such as Bacillaryhemoglobinuria.

Significance
The advent of plastic strips that can be dipped into urine to detect the presence of protein.glucose, acetone, and other abnormal constituents has considerably eased the task of thosesupervising prenatal care in some parts of the world. It is, of course, mandatory to test urineat every routine examination of the pregnant woman. The strips are useful for screeningpurposes, although with some a good eye for color and the means for accurate timing arerequired. In other areas, the older practice of boiling the upper half of a tube of urine todetect protein may still be necessary, and Fehling's and Benedict's solutions are used todiagnose glycosuria. The importance of prenatal care lies more in ensuring that urine isexaminedsatisfactorilythaninthe methodsemployed.
Abnormal constituents most commonly found in urine are protein (proteinuria) glucose(glycosuria) and acetone (ketonuria), and all may have a significance that must not beignored.

Proteinuria
Themostimportantcausesofproteinuriainpregnancyare:

(1) Chronicrenaldisease.
(2) Posturalororthostaticalbuminuria.
(3) Urinarytract infection

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
Volume 3, Issue 1, February 2023
Impact Factor: 7.301

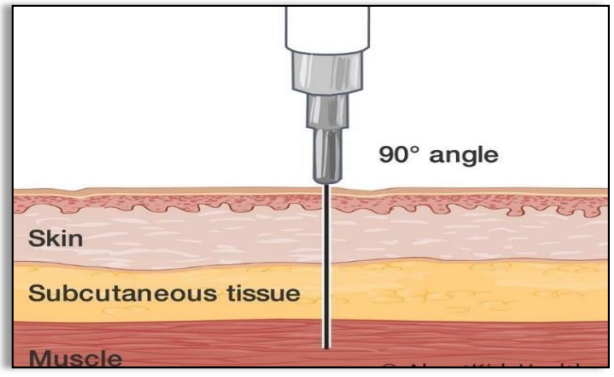
(4) Pre-eclampsia.
(5) Contaminationofthespecimen.
(6) Generaldiseases,

Analysis of constituents of Urine

Color-Yellow to Amber
Volume-1-2Its.Butvariesduetoclimaticconditionsandwaterconsumptionetc.Specificgravity-1.012-1.024
PH-slightly acidic, Range: 4.8-7.5Odor-characteristics.

Chemical composition

Urineisanimportantexcretionofthebodyanditsphysicalandchemicalanalysesindicateseveralhealthproblems.Somephysical propertiesare listed below:
Color:Theurinecolorispaleyellowinhealthyindividuals.Someabnormalcolorsare:Dark Yellow: whenwaterdeficiency, dehydrationoccurs.
LightYellow:indiabetes.
Reddish: due to blood, indicating injuries in the urinary tract.Greenish-yellow:injaundice.Coffeecolor:inhemoglobinuria.
Volume: Normal urine volume varies with water intake, season, and dietary status.Highvolume issuggestive ofdiabetes.Lowvolume indicatesdehydration.
Transparency: Normal urine appears transparent Most Urine samples develop turbidity in afewhourswhen left inthelaboratory.
PH: Urine pH is lightly variable due to the nature of the diet. The pH tends to become acidicafter a high protein or meat diet. Specific gravity: Specific gravity is a measure of dissolvedsolutes in a solution. Urine-specific gravity ranges from 1.005 to 1.050. Specific gravity isusually inversely related to volume. Specific gravity tends to be lower in winter and higher insummer.
Thechemicalcompositionofurineisalsoanimportantindicatorofhealthstates.
Normal chemicals and Constituents are urea, creatinine, organic acids, electrolytes, uricacid,etc.
Abnormal chemical constituents are:Proteins indicating kidney disBile salts-indicating obstructive jaundice Bile pigments-indicating jaundiceKetone bodiesindicatingdiabetesandketosis
Hemoglobin-indicatinginjuriesintheurinarytractIndicanbodiesindicatingconstipationNormalurinecontains bothorganicandinorganicconstituents.
Inorganic constituent includes Na+, Cl-, K+, Ca++, MgSO4-, NH3 & traces of bicarbonate Organic constituents includeurea,uricacid,creatinine,urobilinogen,hippuricacid,indican.



Intramuscular Injection

The importance route is mostly used for drugs dissolved in oily substances or for those in a micro crystalline formulation that are very poorly soluble in aqueous solution that is water(e.g.procaineorpenicillinG).Advantagesarerapidabsorptioninmanyways,ofteninunder30 min. It is widely used route

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
Volume 3, Issue 1, February 2023
Impact Factor: 7.301

of administration of the various types of medicine and the drugs which are not given by others route like intravenous route of administration,subcutaneous injectionhenceitis important.

Intramuscularinjectionisthemethodofinjectingmainmedicationsintothedepthofthebulk ofspecificallyonthe selectedmuscle.

Other advantages of the intramuscular route include the opportunity to inject a largeamount of solution and a reduce the pain and local irritation compared with subcutaneousinjections. Potential complications include serious infections and nerve damage is observed.The latterresults fromthe choiceof a wrongsiteforinjection.

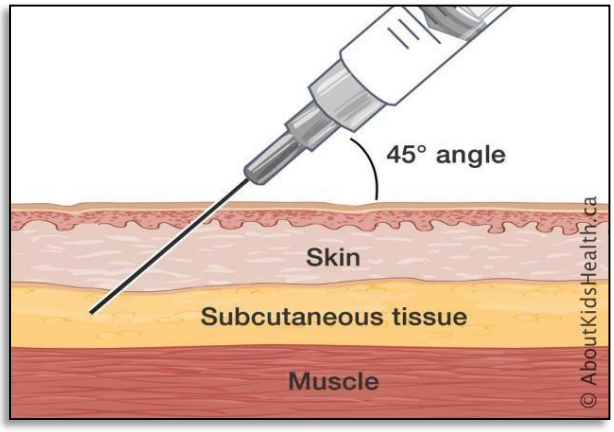
In this process the bulky muscles have more vascularity, and therefore the injected drug quick reaches into the systemic circulation and then reach into the specific region of action. eases Glucose indicating diabetes

Bypassing the first-pass metabolism. It is one of the most common medical procedureswhich performed on an annual basis once in year. However, there is still a deficiency ofuniform guidelines and an algorithm in giving in intramuscular amongst health professionalsin worldwide. Drugs which given intramuscularly both for prophylactic and curativepurposes,andthe most commonmedications include:

Antibiotics- It consists penicillin G benzathine penicillin, streptomycin Biologicals- It consistsimmunoglobins,vaccines,andtoxoids Hormonalagents-testosterone.

Subcutaneous injection:-

Medications administered by the subcutaneous injection consists drugs that can be given insmall amounts (usually less than 1 mL to 2 ml is safe). Insulin and many hormones arecommonlyadministered by thesubcutaneousinjections



By using this route to administration drug quickly can also be administered viasubcutaneousinjectionEpinephrinecomes inanautomatedinjector,iscalledasan EpiPen,that's used to quickly treat serious allergic reactions. While it's used to be givenintramuscularly, epinephrine is also work if given subcutaneously. Some pain medicationsexample morphine and hydromorphone also called Dilaudid can be given by subcutaneousinjectionaswell.Drugs thatdecrease nausea andvomitinglikemetoclopramideordexamethasone (DexPak)arealsogiven bysubcutaneousinjection.

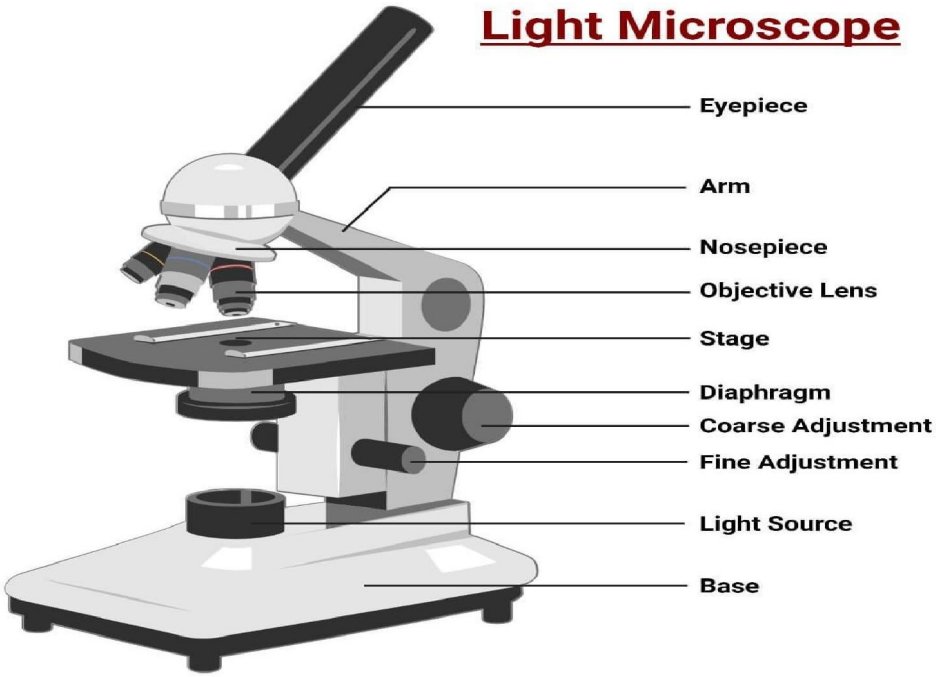
Some vaccines or drugs and allergy shots are injected as a subcutaneous injection. Manyother vaccines are administered as an intramuscular injection into the muscle tissue. Druginjections administered in a same manner for a long time of period, the guideline for druginjection has been updated based on clinical trials for best treatment with overcomingtechnical disadvantages. The most common disadvantages are considerable variation inabsorptionandactionofdrug fromthepatienttopatient,butimportantis frominjectiontoinjectionforthatthepatient.

Intravenous administration provides an excellent administration for the injection which is highly concentrated, acidicandirritant solutions

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
Volume 3, Issue 1, February 2023
Impact Factor: 7.301

Lightmicroscope:

Light microscopy is used to make small systems and samples seen by using supplying amagnified photo of ways they have interaction with visible light e.g. Their absorption,reflection and scattering. This isuse ful to understand what thepatternlooksasifandwhatit is manufactured from, however also permits us to peer strategies of the microscopic international, inclusive of howsubstances diffusethroughoutacellularmembrane.



Fundamentally, a microscope comprises subsystems: an illumination machine to illuminatethe sample and an imaging device that produces a magnified photograph of the mild thathas interacted with the pattern, that can then be considered by means of eye or using adigital camera system. Early microscopes used an illumination device comprising daylightthat became accrued and reflected onto the pattern by a mirror. Today, maximummicroscopes use synthetic mild sources which include mild bulbs. mild-emitting diodes(LEDs) or lasers to make greater dependable and controllable illumination systems, whichcan be tailored to a given utility. In those structures, mild from the supply is typicallyamassed the usage of a condenser lens and then formed and optically filtered before beingfocused onto the sample. Shaping the mild is essential to gain excessive resolution andcomparison, and regularly includes controlling the pattern vicinity this is illuminated and theangles at which mild impinges on it. Optical filtering of the illumination mild, using opticalfiltersthatadjustitsspectrumandpolarization,canbeusedtospotlight.certain functionsof a sample, to improve the visibility of weak signatures or to have a look at a sample'sfluorescence.

Applications:

- Lightmicroscopymaybeusedtodemonstratethepresenceofchemicalfactors atthetissuelevel.
- For instance, Perl's Prussian blue method is used for the detection of iron (III)and Von Koss's silver reaction for the detection of certain calcium, otherreactions may beusedtodetectgold, copper,lead, andzinc.
- It needs to be noted that these techniques hit upon the sure form of anelement; any free paperwork will commonly be lost in the course of thefixationlength.
- For the detection of free calcium, light or confocal microscopy usingfluorescent dyes have outdated thegreaterconventionalstainingmethods.
- In popular, light microscopy is limited through each the variety of factors forwhich stains are available and by means of the decision of the mildmicroscope, which confines observations at first-class to the extent of man orwoman cells. For unambiguous detection of factors and their localization onthe mobile

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
Volume 3, Issue 1, February 2023
Impact Factor: 7.301

andsubcellularlevel,EM strategiesarerequired.

- Light interacts with matter in very predictable ways allowing for opticalsystem design. Depending on the refractive index, transmittance, and dispersive properties of a material, lightcanbemadetoperformoptical"tricks"togeneratecontrast inotherwiseclearsamples.
- Technological advances in transmitted light microscopy have allowedbiologiststovisualizepreviously inaccessible cellular features.
- For instance, Frits Zemike was awarded the Nobel Prize in Physics (1953) forhis invention of the phase contrast micro-scope, which transforms opticalpathandrefractivedifferencesintocontrast.
- As the nucleus has a higher refractive index than the cytoplasm, lighttravelling through each can be modulated independently to create citherconstructive (bright)or destructive interference(dark).
- The resulting contrast-enhanced image permits improved visualization ofboth cellular compartments, as compared to standard brightfield images.Further, as the amount of interference is linearly related to the refractiveindex of a material, phase contrast microscopy can also be used to quantifyfeatures such as bulk protein concentration Later, Shinya Inoue usedpolarized light microscopy to exploit the birefringence generated by sub-resolution microtubules in the mitotic spindle, leading to the first descriptionofmicrotubules asprotein-basedfibers connectedtochromosomes.
- An additional triumph of transmitted light microscopy was the invention ofvideo enhanced Differential interference contrast (DIC) imaging at the MarineBiologicalLaboratoryinthe1980s.
- Using this technology, Vale and col-leagues discovered the kinesin motorproteinthattransportsvesicles alongmicrotubules inneurons.

IV. INTRODUCTION TO SEMIAUTO ANALYZER

Insemi-automaticmethodsthereactionmixtureisformbymanually.Asuitablevolumeisadded in the reaction vessel, then the enzyme is added manually, and mixed with the components of the reaction vessel and then the sensor is allowed to follow the reaction automatically by using auto-sensor.

A large number of methods are used to follow the enzyme-catalyzed reactions then almostany chemical or physical change that can be measured in the recording instrument whichmay be used. The mostly used method is to measure changes in absorption of light and avarious instruments are used for this purpose, from simple filter colorimeters tospectrophotometers. Another important method of study the enzyme-catalyzed reactions isby measuring deviations in fluorescence. Fluorescence spectroscopy is so sensitive and isuseful.forexample,inmeasuringreduced pyridinenucleotides.

A Biochemistry Analyzer is the clinical chemical analyzer machine that can measures theconstituent present within a collected sample consisting of blood, urine and plasma, initially,this procedure was performed manually by the lab technicians and analysts, then it becametedious and cause hindrances. To prevent the delay in introduced test results for eachsample, the necessity for an analyzing machine was registered. Technology gives us way toan Automatic Biochemistry Analyzer. This semi-automatic machine cannot diagnosis ofdiseases and their causes of issues and symptoms in the human body. There might bedifferent varieties of the analyzer which needs to be study and needs realize for recognizelevel of automation is required for the analyzer. Here, we are considering that the Semi-AutomaticBiochemistryAnalyzer.

Semi-Automate Analyzer working depends on two measurementmethods:

Optical Methods

Electrochemical Methods.

The working is same as that of the Fully Automated Analyzer's. The main differencebetween them is that Semi-Automatic analyzer are most practical for use in small scalelaboratories and the medical practices. This is because of it able to easy handle of the lowernumber of samples at a time as compared to the fully automatic Analyzers. This machineryis Semi-Automatic, bench-type that used in Laboratory, research, in-vitro diagnosis, clinicaltests, and also hospital use. This analyzer contains high-speed processor and a built-inthermalprinterandconnectiontoanexternalprinterfor qualityreports.

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
Volume 3, Issue 1, February 2023
Impact Factor: 7.301

At the end, this analyzer proved that itself it's the best delivery results as proven in the topreviews of the clinical technicians. With Med source Ozone do all efforts into quick deliveryandthe acceptancetothe labsandthe clinics,this analyzerisgoodandreliablechoice.Though in the case. a semi-Automatic biochemistry analyzer follows the Colorimetric,Photometry, and principles of Absorbance for the working under the many opticaltechniques.
Anditfollowstheworkingofadirectpotentiometersandindirectpotentiometersprinciplesunder electrochemical technology. To know if a Semi-Automatic analyzer meets yournecessary needs you need to choose a measurement technique, various operation method,samplestatus, andwhichusedreagentmanagementtoknowtheneed.

Varioustestsperformedusing semiautoanalyzer:-
EstimationoftheSGPT byusing semiautoanalyzer(IFCCkineticmethod)
ALT or SGPT catalyzes the reversible transport of an amino group from the alanine intooxoglutarateswhichproducesglutamateandpyruvate.Thepyruvatewasreducedtothelactate byLDH andtheNADH.
Estimationofthetotalcholesterolbyusingsemiautoanalyzer(cholesteroloxidaseandperoxidasemethod)
Cholesterol esterase CHE is hydrolyzed the esterified cholesterol into the free form ofcholesterol. The free cholesterol produced was oxidized to form the hydrogen peroxide(H202), which can react with phenol and the 4 amino antipyrine by the peroxidase toproduce red-colored quinonimine dye complex. The intensity of the color form was directlyproportionaltothe cholesterol presentintheserumsample.
Estimation of a triacylglycerol by use of semiauto analyzer (enzymatic glycerolphosphateoxidaseandperoxidasemethod)
Lipoprotein lipase hydrolyzed TGs to produce glycerol and free form of fatty acid. Theglycerol produced with the help of ATP in the presence of glycerol kinase produces glycerol3 P. oxidized by use of glycerol phosphate oxidase to form H202 which reacted withphenolic compound and the 4-amino antipyrine by the catalytic action of peroxidase toproduce a red-colored quinonimine dye complex, intensity of color produced which wasdirectly proportionaltotheTGspresentinthesample.

Analysis of constituents of blood and urine
SGOT:-
TheSGOTtestforbloodtest.Ithelpstomeasurehowwelltheliver isfunctionbydeterminelevels of a aspartate aminotransferase in blood. Too many of enzyme can indicate aproblem,likeliverdamage[50]

SGPT:-
In the treatment of the tuberculosis the patient is directly give Anti Tuberculosis Drugswithout measure Serum Glutamic Pyruvic Transaminase (SGPT) and Serum GlutamicOxaloacetic Transaminase (SGOT) to know whether or not there is liver injury beforetreatment.

Hemato logical values:
Locally derived reference values for hematological indices are urgently needed to accountfor regional venations in ecology, ethnicity, vitamins, race, gender among many differentvariables These values are essential for have a look at player choice and screening,prognosis as well as right patient control. Most of the translation of hematological indicescurrently used in many African tinal locations is drawn from values primarily based onexclusive populace in Europe North America. Reliable scientific laboratory reference valuesare critical issue in comparative selection-making system for creating a scientific prognosisand different physiological evaluation. Established values offer a crucial tool for patientmanagementandinfluences choices onplayer introns orexclusioninmedicalresearch.
These values are vital for correctly screening of take a look at contributors into clinicalresearch studies, monitoring patho-physiological changes after continuation or ailmentstates, or following the management of medication in healing or medical interventions andvaccine research.
Research is an increasing number of being done in Africa, in particular preventiveintervention trials for infectious diseases. Although several steps were put in area with thepurpose of enhancing the reach infrastructure international, laboratory reference stagesused for trial screening and evaluating detrimental events are frequently based on factsderived predominantly from European and American populations. Reference eprogramming language values are classically

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
Volume 3, Issue 1, February 2023
Impact Factor: 7.301

derived from biometric parameters that fallinside two standard deviations (95% Confidence Interval) of the suggest of a wholesomepopulation. It is a extensively general precept that international populations need to set upandvalidatereferencevaluesbasedtotallyonthewinningsituations andsituations.

Blood Collection, Hematological Analysis and Quality Control

Whilebloodbecameamassedbyusingphlebotomyinzero5mlmicrometertubescontaining ethylenediamine tetra acetic acid (EDTA) (Becton Dickinson, Franklin Lakes, NJ)Hematology evaluation became performed within 24 hours of specimen collection the usageof a 3-Par differential Coulter counter hematology analyzer. Prior to use, the hematologyinstrument become on website online using validation strategies from Contract LaboratoryServices (CLS1) South Africa, CLS also carried out Good Clinical Laboratory Practices (GCLP)schooling to the laboratory group of workers who were involved inside the observe. Internalgreat manage samples with recognized concentrations had to be analyzed on thehematology gadget and consequences confined to be inside CLS supplied ranges beforepatient samples can be analyzed. The laboratory additionally registered in a UKNEQASExternalQualityassurance provider,whichaffordsEQAsamplesinkeeping withmonth.

White blood cells (WBCs), crimson blood cells (RBCs), hemoglobin (HGB), hematocrit (HCT),platelets, granulocytes, lymphocytes, and monocytes had been immediately measured. Redblood cellular indices of MCV. MCH, and MCHC (g/dL), RDW and MPV had beenextrapolated. The analyzer did not give separate counts of neutrophils, basophils andeosinophils.

Thyroid Function Test

Commonly Included Tests:

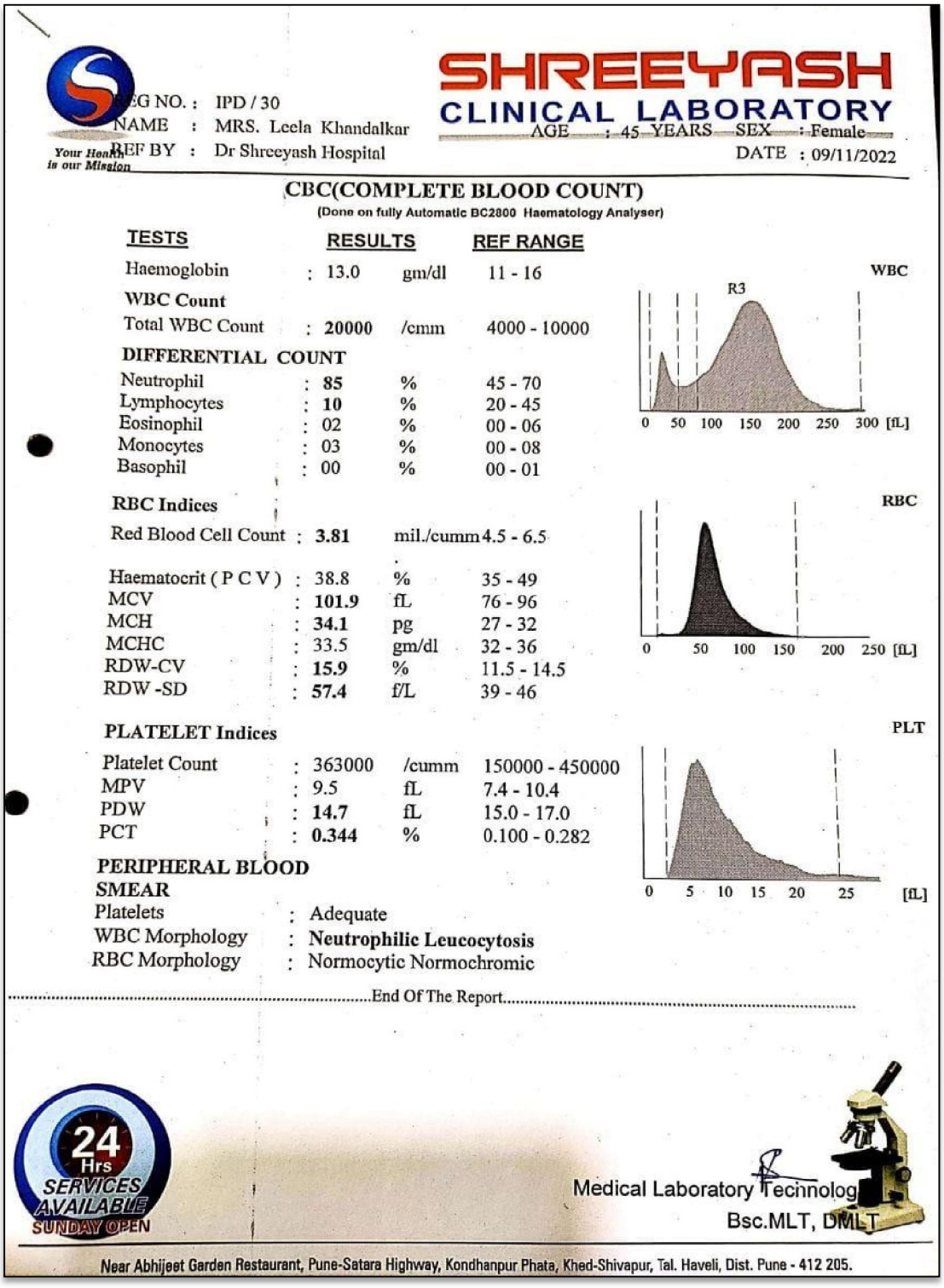
Thyroid assessments commonly used encompass TSH, free hormones, thyroid antibodies(TPO Ah, TP-Ab), TSH receptor antibodies (TRAb), and Thyroglobulin (Tg). Serum is used fortesting. The blood pattern has to he accumulated in a plain tube and sent to the labimmediately for processing. Thyroid medicinal drugs (thyroid hormones and antithyroiddrugs) need to be unnoticed prior to blood taking. To lessen the variability of check effectsspecimens, need to he received at the identical time of day and prandial kingdom. Earlymorning fasting values are higher than late morning non-fasting TSH by using a median of25%. TSH also well-known shows diurnal rhythmicity with a nadir inside the overdueafternoonandpeakatnight time.

ThyrotropinorThyroidStimulatingHormone(TSH):

Med the present day TSH assays in use can measure TSH levels of zero 01 mIU/L or decreaseimprecision of 20% This stage of TSH is also called the useful sensitivity of the asy SSH inuntreated hyperthyroidism is often -0.01mIU/L. Thus, we are able to distinguish moderatehyperthymia from subjects. However, a few unwell euthyroid subjects in interval mayadditionally have TSH values at or near 0.01m101, and require TSH assays with Bierdetection limits (e.g. 0.004 mIU/L) for clearer diagnostic delineation. The normal range forTSHisaroundzero.Fourfour0ml

(SAMPLE REPORT)

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
Volume 3, Issue 1, February 2023
Impact Factor: 7.301



SHREEYASH
CLINICAL LABORATORY
Your Health is our Mission

REG NO. : IPD / 30
NAME : MRS. Leela Khandalkar
REF BY : Dr Shreeyash Hospital
AGE : 45 YEARS SEX : Female
DATE : 09/11/2022

CBC(COMPLETE BLOOD COUNT)
(Done on fully Automatic BC2800 Haematology Analyser)

TESTS	RESULTS		REF RANGE
Haemoglobin	: 13.0	gm/dl	11 - 16
WBC Count			
Total WBC Count	: **20000**	/cmm	4000 - 10000
DIFFERENTIAL COUNT			
Neutrophil	: **85**	%	45 - 70
Lymphocytes	: **10**	%	20 - 45
Eosinophil	: 02	%	00 - 06
Monocytes	: 03	%	00 - 08
Basophil	: 00	%	00 - 01
RBC Indices			
Red Blood Cell Count	: **3.81**	mil./cumm	4.5 - 6.5
Haematocrit (P C V)	: 38.8	%	35 - 49
MCV	: **101.9**	fL	76 - 96
MCH	: **34.1**	pg	27 - 32
MCHC	: 33.5	gm/dl	32 - 36
RDW-CV	: **15.9**	%	11.5 - 14.5
RDW -SD	: **57.4**	f/L	39 - 46
PLATELET Indices			
Platelet Count	: 363000	/cumm	150000 - 450000
MPV	: 9.5	fL	7.4 - 10.4
PDW	: **14.7**	fL	15.0 - 17.0
PCT	: **0.344**	%	0.100 - 0.282

WBC
R3
0 50 100 150 200 250 300 [fL]

RBC
0 50 100 150 200 250 [fL]

PLT
0 5 10 15 20 25 [fL]

PERIPHERAL BLOOD SMEAR
Platelets : Adequate
WBC Morphology : **Neutrophilic Leucocytosis**
RBC Morphology : Normocytic Normochromic

.....End Of The Report.....

24 Hrs SERVICES AVAILABLE SUNDAY OPEN

Medical Laboratory Technolog
Bsc.MLT, DMLT

Near Abhijeet Garden Restaurant, Pune-Satara Highway, Kondhanpur Phata, Khed-Shivapur, Tal. Haveli, Dist. Pune - 412 205.

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
Volume 3, Issue 1, February 2023
Impact Factor: 7.301

Report

Pathology is the branch of medicine that treats the essential nature of the disease. The study of Pathology is essential to detect the disease of the urinary system as well as metabolic diseases like Diabetes or Liver disease thus, this studies provides valuable data like Clinical chemistry of blood its key parameters and their significance, Erythrocytes abnormal cells and their significance, Disorders of WBC, Lymphocytes Platelets and their role in health and diseases. As well as most prominently the test on Urine was done and it shows The Normal Chemical Composition of Urine i.e Urea, Chloride, Sodium, Potassium, Creatinine And Abnormal constituents of urines are sugar. proteins, blood, bile salts, bile pigments, and ketone bodies and also their disease causes are studied.

REFERENCES

[1]. RobertsonS.What ispathology,Nov12, 2021.Pgno.10-20
[2]. Keitel H.G.Bermon H. et.al The chemical composition of normal humanred blood cells. including variability among centrifuged cells volume(1995)10(4)Apr1,1955,Pg.no.370-376
[3]. Felman,A.howdosebloodworkandwhatproblemsCanoccurs,July13,2021.pgno10-20
[4]. David.AndJonathan.s.chemicalphysiologyofbloodflowregulationsbyredcells,vol67-99. March2005,pg.no.4-10
[5]. https://images.app.goo.gl/LW8GrabBLvUJNZNM7
[6]. https://www.britannica.com/science/blood-biochemistry
[7]. PatrickG.GallaghedM.D.Abnormalities,2013.oct15,pgno 15-20
[8]. Camilam.chapero and paramindsqucholew Anemia epidemiology etlong2015Apr23, pg. no.5-7pathophysiology
[9]. GoodwinM., Whattoknowaboutanemia,26March2020,pgno.5-7
[10]. TerritoryM.OverviewofwhitebloodcellsdisordersAug2021,pg. no.69
[11]. YatesA.AnoverviewofwhitebloodcellsdisordersSEP2021,pg. no.10-11
[12]. Ferrer Acosta Y, Gonzalez M., Washington A. Emerging role forplatelet ininflammationanddiseases. 2Aug2014.pgno.10-15
[13]. https://plateletsociety.co.uk/platelets-in-health-disease-thrombosis
[14]. Dewitte A. Lepreux S. Ripoche J. Blood platelets and sepsispathophysiology: A new therapeutic prospect in critical I'll patients, 1Dec2017,pgno.6-10
[15]. https://www.britannica.com/science/lymphocyte
[16]. Parodies C. Badano M. follicular helper T lymphocytes in healthanddiseases,Jan2014,pgno. 3-4
[17]. DrAnitha G. Dr M. Madan, R Salma, G. Obulesu A study onabnormal constituents of urine in Jaundice condition, volume 05, 6 Jun2017, pgno.6-10
[18]. https://www.biologydiscussion.com/biochemistry/excretion/urine
[19]. -composition-constituents-and-deposits/440article
[20]. https://www.sciencedirect.com/topics/medicine-and-dentistry/intramuscular-route